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**INTEGRATION OF FARMERS IN THE SHRIMP SUBSECTOR
IN THE MEKONG RIVER DELTA, VIETNAM**

HO THI MINH HOP

**Dissertation originale
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docteur en sciences agronomiques et ingénierie biologique**

Membres du Jury:

Monsieur le Professeur	BAUDOUIN J. P., Président
Messieurs les Professeurs	LEBAILLY Ph., Promoteur
	BURNY Ph., Membre
	DOGOT T., Membre
	TRAN Tien Khai, Co-Promoteur
	(Université d'économie de Ho Chi Minh ville, Vietnam)
	BUI Chi Buu, Membre
	(Institut des Sciences Agronomiques du Sud-Vietnam, Vietnam)

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Summary

Hatcheries, input dealers, farmers, collectors and processors are the primary actors of shrimp value chain in the Mekong River Delta (MRD) Vietnam, a sector that has many problems of disease, shrimp seed, environmental pollution, and management skills. Holding the strongest power in the shrimp value chain, the processors determine shrimp prices and set up requirements of shrimp quality and size in the market though quality control has not been completely implemented due to the limitations of financial capital, knowledge, awareness, as well as the quality of raw material supplied by collectors and farmers. Farmers stayed in the weakest position in the chain due to their small individual scale, and low skills.

The results of the study show that most of the shrimp farmers stay out of vertical integration under farming contracts while the rest joined in the game without success. Contract farming seems not for small scale farmers who account for a large part in the MRD, and not interesting for producers who get success with their cultivation. Farmers prefer a non-contract option due to non-transparency of interest share as well as cost account. Food safety standards, decision No. 80/2002/QĐ-TTg, culture, trust, government structure, credit support and corruption are the main factors affecting farmers' integration chances.

Floor price mechanism, risk sharing, small scale of the model of vertical integration and excess suppliers in the market, administrative misconception and inefficient public management are the main reasons of failures of contract farming of two case studies in the MRD.

Planning and projection of shrimp production zones are therefore the priority matters to address. Furthermore, re-organizing shrimp farmers into legal teams or groups or cooperatives is also necessary to increase the size of the existing shrimp cultivation units in Vietnam in order to improve the sector.

HO THI MINH HOP (2012): Intégration des agriculteurs dans la filière de la crevette dans le Delta du Mékong, Vietnam. Thèse de doctorat. Université de Liège, Gembloux Agro-Bio Tech, Belgique, 177 pages, 37 tableaux et 53 figures.

Résumé

Les fermes d'alevinage, les fournisseurs d'intrants, les producteurs, les collecteurs et les transformateurs représentent les acteurs principaux de la chaîne des valeurs de la crevette dans le Delta du Mékong (DM). Ce secteur, outre une déficience en compétence managériale, connaît de nombreux problèmes de santé halieutique, de qualité des larves, et de pollution environnementale. Régissant la chaîne, les transformateurs déterminent les prix de la crevette et établissent les exigences en termes de qualité et de calibre des produits. Les producteurs demeurent en position d'infériorité en raison de leur petite taille individuelle et de leur compétence limitée.

Les recherches menées montrent que la majorité des producteurs de crevettes ne s'est pas insérée dans le schéma d'intégration verticale ou l'a fait sans qu'aucun bénéfice ne s'en suive. L'intégration verticale sous forme d'aquaculture sous contrat ne semble pas adaptée aux petits producteurs qui, par ailleurs, dominent le secteur dans le DM. Les producteurs, et particulièrement ceux qui réalisent des volumes satisfaisants, paraissent ne pas voir d'intérêt significatif dans cette intégration. Les exigences de qualité sanitaire des aliments, la décision No. 80/2002/QĐ-TTg, les relations sociales, les habitudes culturelles, la structure gouvernementale, l'insuffisance des crédits et la corruption sont les principaux facteurs affectant les opportunités d'intégration des producteurs.

Le mécanisme de prix minimum et de partage des risques, la taille réduite du modèle d'intégration verticale et l'excès de fournisseurs présents sur le marché, l'encadrement administratif inadapté et l'inefficience de la gestion publique constituent les principales causes de l'échec de la production sous contrat dans le DM.

La planification et l'extension de zones de production de crevettes sont dès lors des problèmes primordiaux à résoudre. En vue d'optimiser le secteur, une réorganisation des producteurs en équipes ou groupements légaux ou autres coopératives constituerait également une piste permettant de limiter la petite taille des exploitations aquacoles telle qu'observée dans le schéma de production actuel.

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LIST OF ABBREVIATIONS

ASEAN	Association of Southeast Asian Countries
AFTA	ASEAN Free Trade Area
AGRIBANK	Agriculture and Rural Development Bank
BMP	Best Management Practice
BRC	British Retail Consortium
EC	European Commission
EU	European Union
Euro GAP	European Good Agricultural Practice
FAO	Food and Agriculture Organisation
FAQUIMEX	Ben Tre Forestry-Aquaculture Import Export Company
GAP	Good Agricultural Practice
GMP	Good Manufacturing Practice
GOAL	Global Outlook for Aquaculture Leadership
HACCP	Hazard Analysis and Critical Control Points
ISO	International Standard Organization
M4P	Market For The Poor
MARD	Ministry of Agriculture and Rural Development
MOIT	Ministry of Industry and Trade
MONRE	Ministry of National Resource and Environment
MRD	Mekong River Delta
NAFIQAD	National Agro-Forestry-Fisheries Quality Assurance Department
NAFIQAVED	National Fisheries Quality Assurance and Veterinary Directorate
NGOs	Non Government Organisations
SPS	Sanitary and Phytosanitary Measures
SQF	Safe Quality Food
SSOP	Sanitation Standard Operations Procedure
SWOT	Strengths, Weaknesses, Opportunities, Threats
RAS	Rapid Alert System
US	United States
VA	Value chain
VASEP	Vietnam Association of Seafood Exporters and Producers
WAS	World Aquaculture Society
WHO	World Health Organization
WTO	World Trade Organization

CHAPTER 1. INTRODUCTION

1.1 GENERAL CONTEXT

Aquaculture sector in general and shrimp in particular is one of the most important export products of Vietnam in the recent years. Ranked third after rice and pangasius, shrimp sector contribute a large share in the GDP of the country and play an important role in the economic development strategy of the Vietnamese government.

In 2007, a milestone in the aquaculture and fishery sector of Vietnam was marked. According to the Ministry of Agriculture and Rural Development (MARD), Vietnam's agricultural export value of US\$6.1 billion in 2011, up 21% over 2010, the total seafood production of Vietnam estimates to reach 5.35 million tons in 2012 (2.2 million tonnes from aquaculture and 3.15 million tonnes from catching) (MARD, 2012). Vietnam is officially ranked in the top 10 seafood exporters in the world in 2007 and has remained the position until 2011 with the shrimp export value to the world accounting for 2.4 billion US dollars (VASEP, 2012).

After one year of being a member of the WTO in 2007, the number of enterprises permitted to export seafood to strict markets such as Europe (EU), the United States (US) and Japan has significantly increased. Around 245 enterprises shipped their products to the EU market, 321 to China, 139 to Canada and 342 to South Korea in 2007 (VASEP, 2008). Up to now, there are 380 enterprises permitted to export their products to the EU market and 200 to Japan (VASEP, 2011).

Vietnam has been exporting seafood to around 130 countries and territories. Export products are increasingly diversified in categories and structures. Besides frozen products, many types of prepared products have been developed, with shrimp products accounting for 40% of the total seafood export volume (VASEP, 2011).

Enormous effort, however, has been exerted by the seafood processing and exporting industry of Vietnam, especially the shrimp industry to achieve such status. These efforts include improving and modernizing plants, applying standards for food safety and hygiene as required by regulatory agencies of importing countries, training of plant management staff and skilled processing workers, and capacity building for farmers. Although improvements have been made, there are still many inherent and exogenous challenges for seafood production in general, and shrimp production in particular. Behind the rapid-fire growth of the industry, there are a lot of questions about sustainability, more so in recent times as questions on profitability have persistently cropped up.

The challenges are likely becoming graver with so many problems concerning the environment such as pollution, chemical residual and contaminant end-products; low quality products; and declining profitability among farmers engaged in shrimp production. The financial difficulties faced by farmers have been attributed to various reasons such as the lack of strict quality management and modern technological investments during processing and distribution, the lack of planning in the production stage among farmers, and the lack of sustainable organisational model in the shrimp value chain (Doan, 2009).

After almost 10 years of growth in the sector since the restart in 1998, the organisational structure of shrimp production in Vietnam is still disorganized, especially at the farm level. The fast shift of large unproductive rice farmers to shrimp production in coastal areas has brought a number of difficulties and inadequacies regarding technical skills, post larvae

supply, disease management, environmental pollution, aquaculture planning and infrastructure development (Nguyen, 2008). Safety and hygiene conditions of end-products are therefore not ensured. Consequently, shrimp export of Vietnam has more risk in production and trade.

Currently, shrimp farming in Vietnam is still dominated by small individual scale farmers. The production chain from shrimp producers to processors and consumers that has evolved has made the sector fragmented, inefficient, with low quality products and decreased competitive capability compared to other countries in the region (Joffre and Bosma, 2009).

To address these problems, the Vietnamese government has issued several regulations and programs with the end view of improving the value chain by promoting vertical integration under contract farming form between shrimp processors and shrimp producers. This strategy did not only establish a linkage between shrimp farmers and processing plants but also created a new value chain model in the sector. Shrimp production in Ben Tre and Soc Trang is an example. However, the vertical integration under contract farming form in Ben Tre and Soc Trang has failed after two years and three years respectively due to the drop out by contractors. The failure of this vertical integration leads to the establishment of a new production type in shrimp value chain where the processing plants source their own raw material. Furthermore it also makes small scale farmers who account for almost 80% of shrimp producers face challenges of non cooperation for upgrading their power.

Hence, vertical integration of farmers in the shrimp value chain in the Mekong River Delta still faces many challenges due to the behaviours of other actors as well as limitation in the socioeconomic and institutional environments. The real situation in Ben Tre and Soc Trang provinces has posed questions on whether shrimp farmers have benefited from their vertical integration under contract farming form in the value chain. Does their participation and integration add more value to shrimp products and make farmers' income more secure? Which value chain is more likely to develop farmers' production and provide them better opportunities?

This study would, therefore, try to answer the above concerns through the analysis of the vertical integration chances of farmers in the shrimp value chain in the Mekong River Delta. To highlight the features of the vertical integration under contract farming, organization form of shrimp production and trade in Ben Tre, Soc Trang as well as the shrimp production in Bac Lieu province were selected as a point of comparison.

1.2 OBJECTIVES AND RESEARCH QUESTIONS

The general objective of the study is to analyze the vertical integration under contract farming form of farmers in the shrimp value chain in the Mekong River Delta and the factors affecting this integration.

Specific objectives of the study are:

- To evaluate the effectiveness of the shrimp value chains in the region;
- To explore the social and technical barriers that affect opportunities of farmers to integrate in the shrimp value chains;
- To compare the integration chances of farmers in different shrimp value chains; and
- To explore future trends and opportunities of farmers to integrate in the value chain.

Based on the research objectives, the following research questions need to be answered:

- 1) Which key drivers, trends and issues affect the changes of shrimp value chain and its actors in the Mekong River Delta?
- 2) Does the integration of farmers into the value chain lead to better production effectiveness?
- 3) Which shrimp value chain suites to the current production conditions of shrimp production farmers in the Mekong River Delta?
- 4) What should farmers do to integrate in the shrimp value chain?

1.3 HYPOTHESES

On the basis of the above research scopes and purposes, the study will be guided by the following hypotheses:

- 1) Key drivers, trends, institutions and policy environment in the shrimp production sector lead to create new value chains.
- 2) Institutions and policy environment and other actors' behaviours affect the opportunities of farmers to join in the chain.

1.4 SCOPE OF THE STUDY

The study will only focus on the black tiger shrimp (*Penaeus monodon*) which is the largest species shrimps in Vietnam and has contributed significantly to the development of the aquaculture sector and hence the economy of the country.

Based on the research results of the project "Improvement of shrimp product quality exported to Europe through building up capacity of shrimp producers, private sector and local authority in Bac Lieu province" funded by the EU Commission to Vietnam in 2005, this research only focuses on intensive production system in which farmers have large harvest volumes but is likely to be affected by several production problems during production crops.

The research mainly follows inductive approach and uses mixed method, in which qualitative methods are dominant. Actors' analysis of the shrimp value chain is most concentrated on the qualitative aspect due to the difficulties of data collection of production costs for the quantitative analysis.

Two case studies of farmers' integration in Ben Tre and Soc Trang provinces also focus on the qualitative analysis to understand the benefits of two partners due to the broken the models before the conduction of research that the past information of production cost may not be right.

1.5 STRUCTURE OF THE THESIS

The study is divided into seven chapters. The first one gives the objectives and research questions that need to be answered. The second chapter focuses on the literature review of value chain and vertical integration under contract farming form in agriculture. The third chapter presents the general information of the shrimp sector in the world with an important

focus on shrimp production in Vietnam. Chapter four gives information on the methodology that has been used to analyse shrimp value chain in the MRD and the vertical integration of farmers in the value chain. Chapter five starts analysing the shrimp value chain by mapping it. The main discussion of the study will be presented in chapter six which analyse vertical integration of farmers in shrimp value chain in the MRD. The last chapter attempts to give needed recommendations to improve the current situation.

CHAPTER 2. LITERATURE REVIEW

2.1 CONCEPTS

2.1.1 Value chain

The “value chain” concept has been widely used as a methodological tool to understand the economic globalization and international trade dynamics. For more than twenty years, value chain has been referred to, although a vigorous debate among economists and researchers about its definition has been initiated ever since (Kaplinsky and Morris 2002).

According to the authors and the activities they want to emphasize, “value chain” might refer to “supply chain”, “market chain”, “production chain”, “distribution chain”, “supply channel”, and “product channel”. It is therefore impossible to make fine distinctions among these often overlapping concepts (Webber, 2000). Nevertheless, some basic definitions can still be formulated for having been used by many studies in this field. Among those, the most widely known was developed by Kaplinsky (2000).

Kaplinsky (2000) describes value chain as the full range of activities required to bring a product or service from the conception through the different phases of production that include procurement of raw materials and other inputs; assembly and physical transformation; acquisition of required services such as transport or cooling, delivery to final consumers; to final disposal after use.

M4P (2009) argued that this definition can be understood in both narrow and broad senses, in which a value chain that includes all activities to create a certain output within the firm is considered as a simple one while the extended form is more complex and tend to be more intertwined.

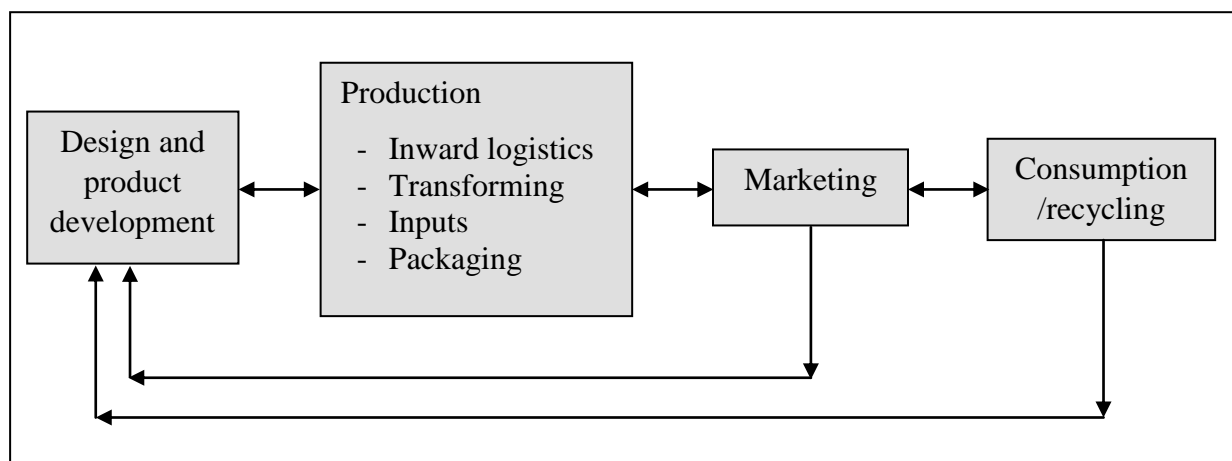


Figure 2.1-1 A value chain in narrow sense (Kaplinsky, 2000)

In its narrow sense, simple value chain activities include the main processes from creating idea, designing, buying inputs, producing, marketing, and after-sales to link producers to consumers (Figure 2.1-1).

A value chain in the broad sense is more complex and does not only look at the firm activities but also consider all the backward and forward actor linkages from raw materials to final consumers. In other words, an extended value chain often incorporates many simple value chain elements that involve the issues of organization and coordination, the strategies and the power relationship of the different actors in the chain. Furthermore, an extended value chain also encompasses the management that includes the roles of government, authorities, financial services, as well as social aspects (M4P, 2009).

In short, whether the value chain concept should be understood in a broad or narrow sense depends on the author's standpoint on the product or activities that he or she wants to emphasize. Therefore, a value chain can span a local, regional, national and global economy.

2.1.2 Actors

Actors interacting in value chain are those involved in producing, processing, trading or consuming a particular product. They actually transact this product through the value chain from input suppliers, traders, processors, transporters, wholesalers, retailers to final consumers (KIT, Faida et al., 2006).

Chain actors can be classified into two levels, namely primary and secondary actors. Primary actors are those who participate directly in the chain by contributing to add value to products or services. They can be named as producers, traders, wholesalers, retailers, and consumers. Secondary actors play their parts as finance and non-finance support services to help the chain functioning, such as credit providers, extension and business service providers, bankers, government, and researchers. In other word, secondary actors participate indirectly in the chain as supporters (KIT, Faida et al., 2006).

A value chain exists when all the chain actors contribute to the whole chain value maximization.

2.1.3 Value chain and supply chain

As mentioned in the above section (2.1.1), despite being used interchangeably, some literatures attempt to distinguish the differences between the two concepts of “value chain and “supply chain”.

Kaplinsky (2002) and Webber (2010) describe value chain as the full range of value-adding activities required to bring a product or service through the different phases of production, including procurement of raw materials and other inputs, assembly, physical transformation, acquisition of required services such as transport or cooling, and ultimately respond to consumer demand. This definition emphasized value chains as an inclusion of all the vertically linked, interdependent processes that generate value for the consumer, and horizontal linkages to other value chains that provide intermediate goods and services. It stated the value chains as focusing on value creation —typically via innovation in products or processes, as well as marketing— and on the allocation of the incremental value.

By contrast, Feller (2006) argued that the term “supply chain” is used internationally to encompass every logistical and procedural activity involved in producing and delivering a final product or service, from the supplier's supplier to the customer's customer. The supply chain main objectives are usually to reduce friction, outages or overstocks, lower transaction costs, as well as improve fulfilment and customer satisfaction (Webb, 2010).

These two definitions confirmed that supply chains focus upstream on integrating supplier and producer processes, improving efficiency and reducing waste, while value chains focus downstream on creating value in the eyes of the customer.

Nevertheless, though value chain is essentially about value, both concepts describe the same network of chains that interact to deliver goods and services. They are concerned with the organization of value adding activities while competing in a particular industry, but the key analytical distinction comes in the value flow undergoing between supplier and consumer (Keyser, 2006). Additionally, in both cases improved business performance and productivity gains can be obtained by the chain's participants (Feller, 2006).

Misnomer or not, the value chain concept has become a staple idea in the management and research literature (Feller, 2006), and is the focus for evolving strategies, enterprise models, and numerous efforts for improving business performance. Creating a profitable value chain therefore requires alignment between what the customer wants, what the chain demands, and what is produced via the supply chain. And while supply chains focus primarily on reducing costs and attaining operational excellence, value chains focus more on innovation in product development and marketing. There is therefore a need to stop considering supply chains and value chains as different entities, but rather to integrate the two.

For that reason, this study will primarily use the term “value chain” to include supply incorporation, value addition, transactions, and market linkages.

2.1.4 Vertical integration

Integration among actors is an inevitable tendency in sustainable value chain development. Integration means bringing together two or more parts into one. There are three basic forms of integration namely vertical integration, horizontal integration and circular integration (Rehber, 1998) in which vertical integration is considered as one of the decisive factors influencing agriculture market structure and competitiveness.

In highly developed capitalist countries, vertical integration is known as one of the agricultural economy's wider phenomena. Nowadays, it has been applied in many developing countries as a solution to improve products or services competitiveness. Economists are showing a growing interest in vertical integration since modern consumers are paying more attention to product quality and origin as well as to production processes (Lehtinen, 1998).

Mighell (1963), Marion (1976) and De Ouden (1996) defined vertical integration as the combination of two or more stages in the production-marketing-chain under a single ownership (Anrooy, 2002), while Porter (1980) defined it as the combination of technologically distinct production, distribution, sale and/or other economic processes within the confines of a single firm. Nevertheless, both definitions emphasize the actors' ownership on vertically related activities along the chain. These vertical integration definitions can simply be understood as a linkage between two or more steps in production and marketing. It is operated by a centralized control and management, with a view to improve the actors' competition in the chain (Mortenson, 1958) through backward, forward and balanced positions, which are three different types of vertical integration.

Vertical integration can be undertaken by any individual, partnership, company, corporation, farm supplier, farmer, assembler, processor, or retailer through an outright purchase by the integrator of facilities for additional stages of supply, production, marketing, or various contractual arrangements through which the integrator achieves a degree of control over additional stages of production (Dunbar, 1958).

Vertical integration most important advantages are found in transaction cost reduction, opportunities for innovation and product differentiation, gains derived from market information, risk reduction and market power increase.

2.2 VALUE CHAIN APPROACH

Despite many papers written on this field, so far, the research on value chain only counts three main streams. The first one, introduced by the Centre de Coopération Internationale en Recherche Agronomique pour le Développement (CIRAD), the Institut National de la Recherche Agronomique (INRA), and Duruflé and Fabre (1988) focused on « filière » approach. The second is developed by Michael Porter (1985), introduced elaborated concepts on value chain; while the third one, is pointed by Kaplinsky and Gereffi (1994, 1999, 2000, 2003) who developed the global chain approach.

2.2.1 “Filière” approach

“Filière” means “thread” or “chain”. It was developed by francophone researchers at the Institute National de la Recherche Agronomique (INRA) and the Centre de Coopération Internationale en Recherche Agronomique pour le Développement (CIRAD). Many theories and methodologies such as systems analysis, industrial organisation, institutional economics, management science and Marxist economics, as well as various accounting techniques rooted in neo-classical welfare analysis were borrowed by “filière” analysts to build their method (Kydd, 1996).

The “filière” was used as an approach to analyse the chain in many researches on agricultural system in France’s colonial countries (M4P, 2004). It was considered as a tool to study the ways in which agricultural production systems (especially rubber, cotton, coffee and cocoa) were organized in the context of developing countries. It paid special attention to quantitative analysis, vertical integration and contract manufacturing process (Kaplinsky, 2002) to see how local production systems were linked to the processing industry, trade export and final consumption in French agriculture (Raikes, 2000).

There are two “filière” approach versions. The initial one was designed by French scholars through the analysis of value added process in US agriculture. The French had in mind to apply it to contract farming as it was particularly fitting their colonial policy requirements during the 1960s, when they focused on exporting commodities from developing countries (Raikes, 2000; Kaplinsky, 2002). The approach emphasized the local economic multiplier effect derived from input-output relationships between firms. It focused on the benefits resulting from scale economies, transaction and transportation costs, in order to determine the right prices (Griffon, 1989). It was therefore much focused on quantitative techniques.

The second one, which could be called a modern version of “filière” approach, has until recently been less concerned about ‘getting the prices right’ than about ‘getting public institutions right’ (Raikes, 2000). It analyses an additional political economic dimension, especially the role of public institutions in technical relationships to create a smooth commodities flow. Trade studies were seen as largely superfluous since these areas were controlled by state institutions which undertook all commodities transport and marketing at prices set by the central administration (Raikes, 2000; Kaplinsky, 2002). It thereby brought “filière” analysis closer to contemporary value chain analysis (Kaplinsky, 2002).

However, “filière” analysis still focuses much on qualitative aspect as a static character and reflects the relations among actors at a certain point while the growing or shrinking flows of commodities, knowledge and the rise or fall of actors were not indicated (Kaplinsky, 2002).

Moreover, it is noticeable that the “filière” analysis has been usually applied to domestic value chains in francophone countries while no scholar gave any conceptual reason for that.

2.2.2 Porter’s framework

Michael Porter is known as the first author who introduced value chain concept. He mentioned the concept in his book “Competitive Advantage: Creating and Sustaining Superior Performance” in 1985, when he worked on the production, trade and service systems which strongly affected the economies of the United State and other developed countries.

Porter used the idea of enterprise competitive advantage on cost reduction strategy. He worked on how a firm can offer a certain good or service of equivalent value compared to competitors but at a lower cost. He also worked on the differentiation strategy (for example how an enterprise can produce goods that customers are willing to pay for at a higher price) to conduct a value chain framework. He used this framework to detect firm sources of competitive advantage by disaggregating a series of activities including product design, input procurement, logistics, outbound logistics, marketing, sales, after-sale and support services such as strategic planning, human resources management, and research (Kaplinsky, 2002).

According to Porter, the value chain is a basic tool for examining all the activities that a firm may improve and how the interaction is necessary for analysing the competitive advantage source (Feller, 2006).

Porter defined value as the amount buyers are willing to pay for what a firm provides. He conceived the value chain as the combination of nine generic value added activities, which work together to provide value to customers, operating within a firm. These nine activities can be distinguished between primary and support activities (Figure 2.2-1).

Support activities include:

- Inbound logistics: All activities associated with receiving, storing and disseminating inputs.
- Operations: All activities associated with transforming input into final products.
- Outbound logistics: All activities associated with collecting, storing and physically distributing products to buyers.
- Marketing and sales: All activities associated with providing means by which buyers can purchase the product.
- Service: All activities associated with providing service to enhance or maintain the products value.

Primary activities embrace:

- Firm infrastructures: Activities that include general management, planning, finance, accounting, legal, government affairs, and quality management.
- Human resource management: Activities that involve the recruiting, hiring, training, development and compensation of all types of personnel.
- Technology development: Activities that can be broadly grouped into efforts to improve the product and process.

- Procurement: Activities that refer to the functions of purchasing inputs used in the firm's value chain.

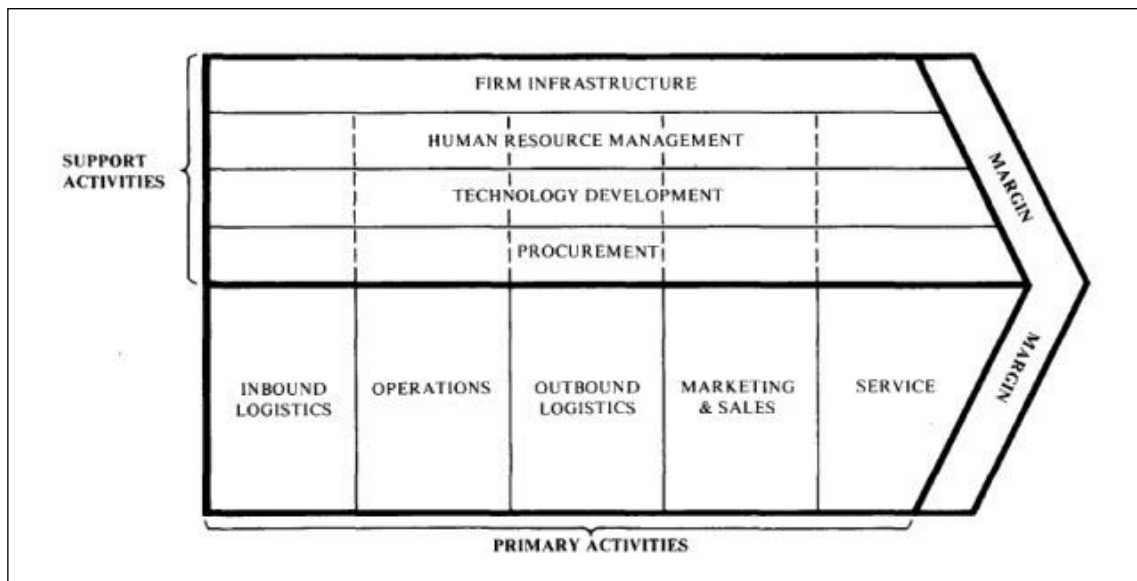


Figure 2.2-1 Porter's value chain

Porter linked up the value chains between the firms to what he calls value chain system. Therefore Porter's value chain can be understood as a firm's activities system set up to add resource values to products/service for the final customers (Figure 2.2-2).

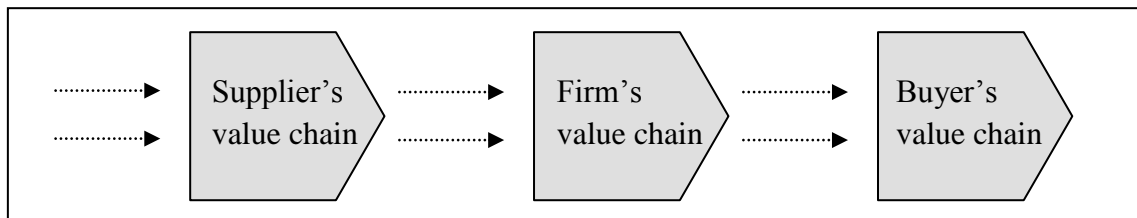


Figure 2.2-2 Porter's value chain system

In addition, Porter described value chain as a way to determine which type of competitive advantage to pursue and how to pursue it. It also helps in identifying which competitive advantages an individual firm should position itself in the market and in relationship with suppliers, buyers and competitors.

According to Porter, industry value chain and the organization's internal value chain are the two main components of value chain. Porter also identified that the industry value chain is composed of all the value-creating activities within the industry, beginning with the first step in the course development process, and ending with the completed delivery of courses and related services to the learner.

In short, Porter's value chain displays total value which is measured by the amount buyers are willing to pay for what firm provides them. Therefore, value chain has a strict business

application in Porter's framework with the main aim of supporting executive management in strategic decisions.

2.2.3 The global approach

In the context of world globalization, one needs to understand the way a firm and a country globally integrate. Consequently, the global chain approach was proposed.

The global approach is derived from the Anglophone school on value chain research. It refers to global commodity chains (GCC) introduced by Hopkins and Wallerstein in 1977 and 1986. They both highlighted the state power in shaping global production systems (Sturgeon, 2008). Later on, Gary Gereffi and his collaborators developed the concept of global commodity chain within a political economy of development perspective during the mid-1990s. Kaplinsky continued to promote this concept at the end of the 1990s.

Gereffi started discussing about grain trade in Europe during the sixteenth century, with a special concern about industrial commodity chains (Hopkins and Wallerstein, 1994), of which, many activities along a given commodity chain are encompassed by centrally-coordinated and internationally-dispersed production. It presented the emergence of a global manufacturing system in which economic integration goes beyond international trade in raw materials and final products (Raikes, 2000). In his researches, he focused on producers, exporters, importers, and retailers networks in the framework of international trade relations. By accessing these networks, developing countries and market actors in developing countries might get success.

According to Gereffi and Korzeniewicz (1994), a commodity chain refers to the whole range of activities involved in the design, production, and marketing of a product. It can be understood as a sequence of activities required to make a product or provide a service (Schmitz, 2005). Relying on this definition, he established two distinct types of international economic networks called "producer-driven" and "buyer-driven" global commodity chains. Producer-driven commodity chain is undertaken by producers and buyer-driven commodity chain is undertaken by buyers.

Producer-driven and buyer-driven global commodity chains have different entrance barriers to the market. Producer-driven chain entrance barriers are their large-scale, high-technology production, heavy investment, scale economies, while design, marketing, brand-names and retailing requirements constitute buyer-driven chain entrance barriers. Therefore, producer-driven chain is mostly applied in the automobile and aircraft industries while buyer-driven is applied in garments, footwear, toys, and agriculture (Raikes, 2000).

Through these two commodity chains distinctions, Gereffi brought out the role of governance which normally shows the power relations imbedded in value chain analysis. He stated that value chains are not just market relations strings where buyers and sellers act freely (McCormick, 2001). Often, some actors, that are also called "lead firms", have power over others in the value chain (Schmitz, 2005). These lead firms are determined as a dominant party who holds the overall characteristics of the chain and leads the firm to become responsible for upgrading activities within individual links and coordinating interaction between the links (Kaplinsky, 2002). Therefore, the global chain analysis central concern is to unpack the relationship between lead firms and other actors in the chain to develop the opportunity or to limit constraints created through this relationship (Schmitz, 2005).

In some cases, the global chain analysis utilized the value chain framework to examine the networks created in international trade activities and that shows the way a firm or a

developing country integrate in the global market. It also helps to determine the income distribution among global market actors. The most important points of the global chain analysis are the following: 1) the role of governance through two chains, namely the buyer-driven and the producer-driven ones; and 2) the power inclusion in economic relations and transactions in international production and trading relations (Raïke, 2000).

2.3 Value chain analysis

Nowadays, value chain is not a new concept anymore. Since Michael Porter's study on competitive advantage in 1985, understanding the value chain in order to upgrade final product/service value has been catching many economists' attention due to 1) the systemic competitiveness increase, 2) the production efficiency necessity for successful global market penetration, and 3) the requirement of understanding the dynamic factors making the most out of globalization for sustainable income (Kaplinsky and Morris, 2002).

Besides, one of main purposes to upgrade a final product/service value through a value chain development is to make the consumer at the end of the chain satisfied. Consumers will indeed sooner or later turn to another supplier if the product or service does not fulfill their requirements, preferences, and desires. It is therefore important to understand each stakeholder and supportive actors' activities to improve the value chain in order to meet the end customers' needs (Herr, 2007).

To improve a value chain performance, one may look at the economic activity by breaking it down into parts, which is the essence of a value chain analysis. This became a method for accounting and presenting the value created alongside a product or service transformation process from raw materials to a final product consumed by end users.

Based on the value chain concept, the value chain analysis identifies and maps the relationships of 1) the activities performed during each processing stage; 2) the value of inputs, processing time, outputs and value added; 3) the activities spatial relationships, such as distance and logistics; and, 4) the structure of economic agents, such as suppliers, the producer, and the wholesaler (World Bank, 2007).

Roben (2006) discussed that the value chain method analyses three key dimensions 1) organizational systems for the coordination amongst actors; 2) knowledge systems for combining information, skills and technologies; and 3) economic mechanisms for product and technology selection and for providing market access that is usually used to assess the value chain performance.

Similarly, Webb (2010) stated that value chain analysis rests on the different activities segmentation and mapping of interactions that may generate costs or value in the production and sale of a product or service. On the other hand, Kaplinsky and Morris (2002) affirmed that the core competences analysis and identification will lead the actors in the chain to outcomes to functions where it has no distinctive competences.

There are six main activities involved in the value chain analysis method (Vermeulen, 2008), namely:

- Mapping out the value chain and identifying the main actors
- Mapping the key policies and institutions that influence the chain functioning
- Establishing the key drivers, trends and issues affecting the chain and its actors
- Exploring future scenarios in relation to uncertainties about drivers and trends

- Identifying the options for better inclusion of small scale producers
- Developing strategies for supporting policies and institutional change

According to SNV (2004) and M4P (2009), these six main activities can answer the following questions:

- What are the target markets that the value chain serves?
- What/where are the main competing value chains?
- What are the product types, forms, and presentation that each target market seeks?
- What are the pathways from source to each end-market?
- What are the value chain's comparative advantages?
- How do financial costs rise as the product moves along the value chain?
- How does market value rise as the product moves along?
- Where is the highest potential for sales or profitability growth?
- Who are the most important actors within the value chain and how do they behave?
- To what extent is trust and cooperation evident at each step in the chain?
- What is the volume and value share associated with different types or cohorts of actors?
- Where are the apparent choke points or bottlenecks in the value chain?
- What is the overall size of the value chain?
- How does this value chain connect to others, and what possible synergies exist?
- How has the value chain evolved over time?
- How is the value chain governed, and who holds power or influence?
- In what ways is the value chain regulated from outside, or self-regulated?
- What is the value chain institutional framework (for example, producer or trade associations)?
- What factors in the enabling environment hinder or support chain growth and prosperity?
- What is the potential for improving or upgrading any of the above?

In addition, value chain analysis method can be used to identify the key public policies, as well as institutional and infrastructure factors that would underline the constraints in a product business environment. It also points out the linkage between public policies and the actors performance in the chain. It can therefore constitute some important direct inputs for government's export competitiveness strategies in many developing countries such as Bangladesh, Indonesia, Kenya, Thailand and Vietnam (World Bank, 2007). Basically, the government will carry out numerous advisory and investment projects through value chain analysis, including product quality standards, trade policy, and linkage among actors (Figure 2.3-1).

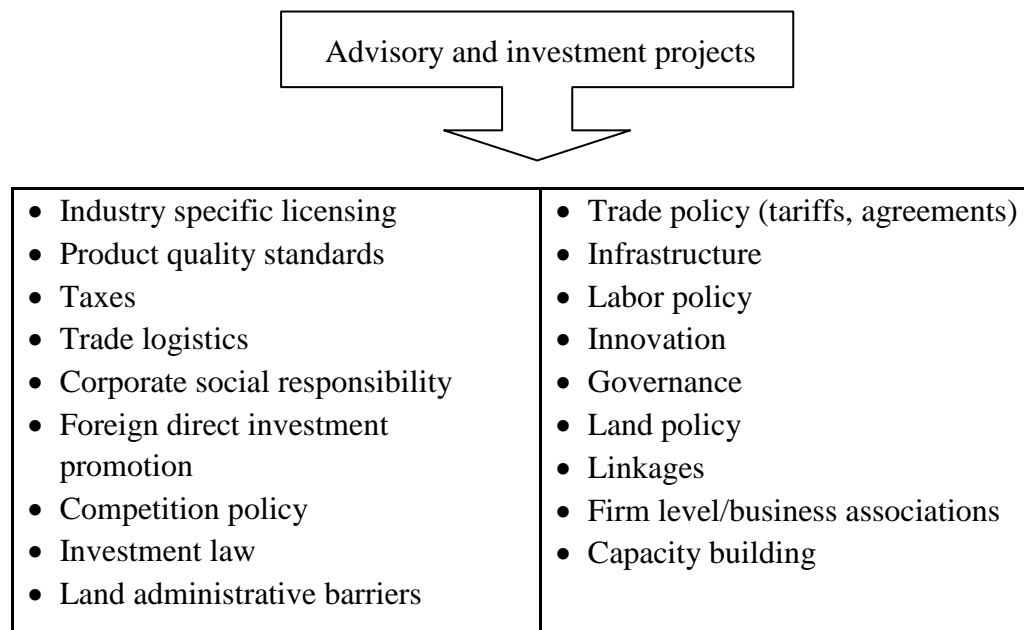


Figure 2.3-1 Potential strategies following a value chain analysis (World Bank, 2007)

One of the most significant expected outcomes of the above mentioned projects is that they can bring together producers, intermediaries, supportive actors, and other relevant stakeholders in the different segments of a value chain. The findings of the value chain analysis enabled these actors to jointly seek solutions to overcome key impediments that affect the chain performance.

2.4 VALUE CHAIN IN AGRICULTURE

Generally, agricultural and industrial value chain creation and development are alike. An agricultural value chain includes an input supply, primary producers (farmers), collectors, processors, traders, exporters, whole sales, retailers, and final consumers range of activities. These actors encompass the official and unofficial linkages among them under governmental, local authorities or other services supports needed to improve the chain (Figure 2.4-1).

Due to agricultural production's typical characteristics and complex range of activities, the concept of value chain "from farm to fork" is often taken into account in the broad sense and makes it different from other industrial value chains (Rich, 2004).

The main differences between agricultural and industrial sectors value chain are (Cao, 2008):

- Agricultural value chain is in-continuous: agriculture goods are crops and animals that are seasonal. It therefore leads to agricultural value chains in-continuous forms, with large output volume during harvest time while volumes are reduced or non-existent during off-season. Consequently, agro-product supply excess often occurs at the end of season and makes products prices drop down. Conversely, prices can rise significantly during off-season.
- Agricultural value chain is unstable and unsustainable. Agriculture is a highly risky sector that is strongly dependant on climatic factors such as temperature, rainfall, light,

drought and diseases. In agricultural production, risks are ever-present and cause unstable and unsustainable agricultural outputs. Consequently, value chain in this sector is known as unstable and unsustainable.

- Value chain has a complicated organizational structure: The main difference between agricultural value chain and other value chains lies in the participation of many individual farmers who have different levels of education, knowledge, production skills as well as financial capacity. Unlike the industrial sector, this makes the agricultural value chain organization very complex to monitor in order to produce large volumes of homogenous products. Indeed, the involvement of many individual farmers in the chain requires a suitable organizational structure to manage producing homogenous products that meets quality requirements to satisfy market demands. This is one of agriculture's major problems that need to be solved in order to develop an agricultural value chain.
- Most of the agricultural value chains are local. Most of the agro-products are perishable and therefore considered short-life goods. They rot in a short time without appropriate post-harvest treatment. Preservation is always considered to be the solution. However, processing agricultural products requires important financial capital, which explains why post-harvest activities are stagnating in developing countries. Hence, agro-product sales are often limited to the local market with a local value chain form.

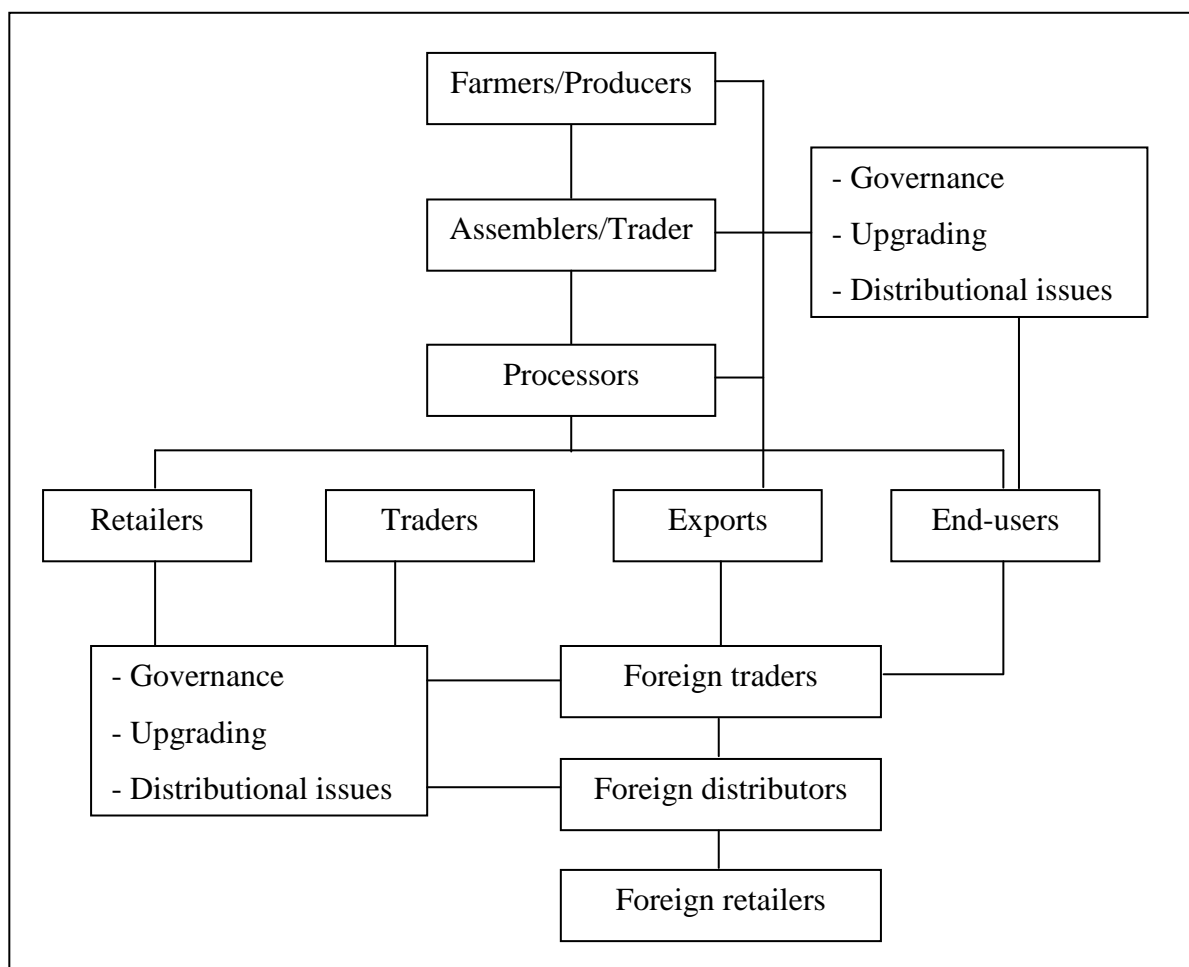


Figure 2.4-1 A hypothetical value-chain in agriculture (Rich, 2004)

Considered in a broad sense, agro-value chain involves numerous interlinked activities among multi-sited industries. It encompasses all activities that take place in the farms from rural to urban areas with requirements of input supply such as seed, fertilizer; agricultural machines; irrigation equipment and manufacturing facilities, and continue with handling, storage, processing, and packaging and distribution (UNIDO, 2009).

2.5 LIVELIHOOD SECURITY, PRO-POOR AND VALUE CHAIN

Traditional economic development strategy in a developing country usually forget the important role played by markets. It often focused on poverty reduction in term of production improvement and food security without looking at market demand. A significant proportion of national funds are used to support the provision of agricultural production inputs such as seeds, fertilizers and irrigation systems (UNIDO, 2009). Many research results showed that it was unsustainable. New economic development design intervention strategies take into account a longer social preparation phase that bring individuals into a deeper market approach in livelihood options. In the value chain concept, every household plays some producers and/or processors part.

The livelihood framework is centred on individual household and seeks to understand the human, social, financial, natural and physical capabilities that household can mobilize to build a livelihood strategy. In general, the livelihood framework is very helpful in understanding target beneficiaries context, motivations and resources, and is particularly adapted to the most vulnerable. The framework seems extremely useful in understanding the complex situation, risks, and resources at a household level, particularly social factors that more economic practitioners may not immediately comprehend. Social relationships, obligations, and taboos can powerfully influence a household's behaviour, perception of risk, expectations of benefits, and consumption patterns. This is particularly true for the most vulnerable, for whom social capital may be the most important and tangible asset they possess. Beyond this however, the livelihood framework is extremely descriptive, static, and reactive. Basically, we can use the livelihood framework to understand the people we are trying to help but it does not seem helpful to determine how to help them.

The value chain approach by contrast recognizes households and enterprises as part of a market system. It is, first and foremost, the entire system performance that determines whether individuals within it can benefit and grow from their business activities. Accordingly, we look at the systemic factors that affect this performance: end markets for products, enabling environment issues, linkages between businesses, support services such as finance, legal support, or agricultural extension services, needs for upgrading, and the effect of power imbalances and trust within the system. Ignoring these systemic factors is likely to undermine any efforts to improve the performance of any individual business.

It is obvious that, one way or another, almost all of us is involved in a value chain. Some individuals are playing a consumer part in value chains by eating, drinking or using final products, while others are playing the part producers/farmers, traders, collectors, whole sellers, retailers, processors, and exporters. In other words, a value chain involves many players and in return these players see their livelihood impacted positively or negatively by such participation. Therefore, a strong value chain might bring up a significant benefit to all actors involved in it. However, it is a fact that, according to their role and power, some people in the chain get more benefit than other. In agro-value chain, traders, collectors, processors are the most powerful actors, so they can dictate the transaction terms to others by buying input supply at bottom-prices from farmers and sell it at high prices.

Literature often states that farmers are at disadvantage in the value chain for they usually get the lowest benefit though they might play a major part to operate the chain and though agriculture plays a central part in poverty reduction within economic development strategies. This explains why there are still many poor farmers in developing countries, particularly among smallholders despite being integrated in agro-value chains.

For farmers in developing countries, participating in the value chain might bring both opportunities and pitfalls (UNIDO, 2009). As mentioned above, traders, collectors and processors hold the main power in the chain. They usually set up technical requirements on food safety and products quality standards that limit farmers' access to the market. To improve their competitiveness and to move to higher-value activities, farmers therefore need technological and institutional support as well as market knowledge (Michel *et al*, 2009). In other words, it raises the questions of how policy makers and development assistance agencies should deal with these trades-off and how the long-term effects of engagement can be assessed (UNIDO, 2009) through value chain analysis to give a contribution to pro-poor economic development.

Value chains are a way to understand the primary and secondary actors' interaction with markets, whether they are domestic or global ones. Value chains are also a market-oriented approach, in the sense that all activities in the chain are directed towards the market. In that sense, no market means no value chain (Michel *et al*, 2009). Therefore, value chain analysis main target is to make market work better for the poor (M4P). It can help the poor increase the amount gained from their products and thereby improve their income. It also increases the farmers' income share among the chain actors.

Michel *et al* (2009) indicated seven important points that make value chain a helpful tool to develop pro-poor economics:

Firstly, value chains help to understand how the poor can engage, or engage more beneficially, in domestic, regional or international trade. Most value chain researchers state that farmers are usually in the lowest position compared to other lead actors that decide the rules of the game. Trade help in the use of raw economic power to extract value from the chain, apart from its role in productivity and factor costs.

Secondly, value chain analysis focuses on markets, commercial viability and development concerns in order to have economic viability and sustainability. This is an important progress compared to traditional enterprise development projects that often focused almost exclusively on chain actors like producers or suppliers, and neglected the demand side. However, traditional approaches to enterprise development have often paid insufficient attention to the existing market systems in which the interventions of external donors and state took place. Consequently, value chain analysis is compatible with market development approaches to development. It provides a framework for engagement with both business and beneficiary groups. Therefore the win-win outcomes for all participants are the aim of successful value chain development projects. This implies that "there is nothing anti-development about generating incentives for the already rich to get richer, providing it is done in a way that includes, and benefits, to groups of poor people".

Thirdly, value chains give a highly qualitative diagnostic tool to identify critical issues and blockages for specific target groups as well as helping generating robust and effective policies and development strategies. It does not only provide a robust explanation on why the resource poor are poor but it also represents a logical framework to formulate concrete intervention strategies to change the circumstances of the poor. So more or less, value chains are a diagnostic tool to understand what reality currently is – and how it can be changed for the better.

Fourthly, value chain analysis identifies who in the chain benefits from production for diverse final markets in order to help focusing minds on how best to facilitate the participation of the poor in the chains. From these, poor producers can be assisted in creating their own barriers to entry through upgrading strategies.

Fifthly, “value chain analysis is inherently scalable”. Reducing poverty at scale can be increasingly concerned by external donors. Only few beneficiaries are benefited from successfully developing value chains while the rest are becoming difficult to justify. The logic of value chain development exercise can be applied to a cluster of firms or a region or country.

Sixthly, value chain analysis is relatively evidence-based and action-oriented. This contains a contrast with the academic theories on orthodox trade and development. It also requires an acceptance of a fairly improbable neoclassical assumptions range about how economic actors work and commitment to the theory when the empirical evidence fails to support these assumptions. Nevertheless, there is no “value free” in value chains. They are based on power as well as competitiveness and value addition notions.

Finally, value chains give a way forward as policy and restructuring tool. The reality in international trade proves that achieving systemic competitiveness requires cooperation along the chain, as well as within links in the chain. A chain is only as strong as its weakest link. The creation of a collation of interested actors involved in promoting participation by the poor, or the reorganization of value chains, is a necessary process to ensure that appropriate global competitiveness is realized. This restructuring must include both private and public sector participants concerned with endogenous and exogenous rents. There is evidence of both market failure and state failure in international trade.

2.6 VERTICAL INTEGRATION IN AGRICULTURE AND CONTRACT FARMING

2.6.1 Vertical integration in agriculture

In general, vertical integration in agriculture is almost the same as in industry. It emphasized the actors’ ownership of vertically related activities along the chain by creating a linkage among them. Vertical integration within agriculture and the food industry is influencing market structure and competitiveness of agriculture (Grega, 2009). Webber (2010) mentioned that vertical integration is the heart of value chain development to strengthen mutually beneficial linkages among firms so that they work together to take advantage of market opportunities.

One family can collect seeds, grow plants and consume it themselves in autarky. However, following the evolution from subsistence farming to the present market orientation, agricultural production is related to many marketing activities that transfer food from raw material to final products for consumers. It is served by a large number of industries which supply inputs for farmers to deal with their production activities (Rehber, 1998). Farmers cannot stay isolated in the chain any more after joining into the market. They are obviously involved in the value chain to identify the buyers, solve a quality problem or improve the packaging and manage the chain despite often being concerned mainly on their own activities like land preparation, fertilizer application, pest control and crop harvest when it is mature (KIT, 2006). They might be involved in further activities by integrating in the chain through a linkage with other actors in the form of vertical integration as part of the chain management.

Vertical integration between farmers and other actors in the value chain creates backward and forward linkages. Forward integration is concerned with the expansion of agricultural production towards product finalization and distribution while backward integration is directed to the preceding phases to engage inputs from the preceding subject within the products (Grega, 2009).

The overall objective of vertical integration in the value chain is creating a larger profit for the participants through linkages. Besides, it also brings more market share for actors involved in the chain and improves the quality of products (Meulenberg and Kool, 2004). Dunba (1958) and Raymon (2004) indicated the following developments created through vertical integration in agriculture:

Firstly, the healthiness, food safety, environmentally friendly production process, biodiversity maintenance, animal welfare, traceability and compliance with international labour laws will be improved to comply with the requirements of buyers to satisfy consumer demand. Practical experiences showed that vertical integration is a perfect way for producers to comply with importers with strict markets demands. Indeed, the EU and United States have for instance stringent requirements on food safety and traceability and require Hazard Analysis Critical Control Points (HACCP) procedure and are imposing diverse private standards or certifications to assure product quality.

Secondly, vertical integration links structure and facilitates information sharing resulting to new technology adoption and rapid spread in production processes. There will also be more rapid results in knowledge transfer to other production areas and result in greater specializations.

Thirdly, uniformity of products in terms of quality will improve by better-informed quality control managers among actors participating in the vertical integration linkage. It also provides a high mutual dependency according product specificities.

Fourthly, international competition will be increased thanks to market demand compliance and trade liberation achieved from the vertical integration among actors in the value chain.

Raymond and Nguyen (2004) also pointed potential advantages of vertical integration in agriculture that include transaction costs reduction, innovations and product differentiation opportunities, economics of information, risk reduction and market power improvement.

According to Raymond and Nguyen (2004), the reduction of cost related to delineation, negotiation, safeguarding, monitoring, and enforcing agreements will contribute to a decline in transaction costs. Transaction costs usually result from mutual impact of actors' behaviours. Indeed, farmers like to shorten the value chain by cutting out traders and collectors to gain added value and extra income. By reducing the amount of players involved in the business activities, transaction costs can be decreased for all actors in the ce hain.

Opportunities for innovations and product differentiation can be obtained through greater control over the production stages, especially in long value chains. Porter (1980) stated that backward integration allows the firm to obtain specialized inputs through which it may improve or at least distinguish its final product while forward integration gives the firm a better or more timely access to market information, allowing a more rapid adjustment of product characteristics.

Through vertical integration, actors will be better informed by their partners in the linkage about market, and vice versa.

Zuurbier (1996) emphasized that the possibility to control supply activities decreases uncertainty and makes it possible to keep track of stocks and other inefficiencies, thereby reducing the risk in production.

However, by integrating more in the chain, farmers have to increase a number of chain activities from farming into processing, transport and trading. These will require a new set of assets and skills on technology, finance, human resources and organisation (KIT, 2006). Consequently, it will increase costs and risk in their production. To reduce these limitations of vertical integration in agricultures, farmer need to be involved in chain management in the aspects of information and innovation managements, chain cooperation and marketing intelligence by keeping records on their production activities to understand better their production costs. Furthermore, in the current market situation, these records can guarantee the buyers quality of products basing on source of procedure as traceability.

There are several elements that prevent farmer to participate in a links of a vertical integration in the value chain such as trust among participants, lack of leadership, mistrust of competitors, weak information, or lack of scale (Webber, 2010).

Besides, Kaplinsky and Morris (2002) also indicated characteristics of relationships that have the largest effect on the actors' possibility to integrate in the chain as follows:

- Length of trading relationship
- Ordering procedures
- Contractual relationship
- Inspection
- Degree of dependence
- Technical assistance
- Communication
- Price determination
- Credit extended
- Outsourcing payment terms

The literature frequently emphasizes the idea that building trust by rewarding collective action among actors is crucial for upgrading a value chain. Indeed, working within value chains requires establishing relationships in order for participants to gain the win-win perspective. When trust, learning, and benefits are shared among firms through vertical or horizontal integration, there is a greater likelihood of generating collective efficiency and scale (Webber, 2010).

For most countries, both developed and developing ones, vertical integration have been spread under the form of contract farming applying to many agro- products such as the dairy cattle in the Netherlands and Denmark, sugar cane plant in Turkey, pineapple in Ghana, fruits in Kenya and fishery in Thailand. More detail of contract farming will be discussed in part 2.6.3.

In conclusion, it is obvious that vertical integration can help farmers' improve their position in the value-chain by increasing their bargaining power. However, vertical integration in agriculture requires a specific policy environment to solve common issues. Furthermore, chain leaders and facilitators need to be identified in order to strengthen the linkage and to build trust among chain actors.

2.6.2 The matrix of chain participation by farmers

Kit (2005) built a chain participation matrix to better understand better farmers' position in the value chain (Figure 2.6-1).

Farmers grow agro-products and may sell them to traders at farm gate prices. The selling price is usually dictated by the traders and farmers have no other choice than accept it. In this situation, they are just an actor in the value chain whose role is limited to the farm.

Alternatively, farmers may process their products before selling them to traders at the market. By adding more activities to the chain, farmers move up to a chain activity integrator part. They can buy inputs from input suppliers to process their products but they are not involved in managerial control of quality management, consumer targeting and proactive innovation.

Chain partner is another potential position for farmers in the chain. In such case, they sell their products to a farmer association without any added processing or grading. They can control the selling price through this association and gain benefit from the partnership with traders, processors or retailers.

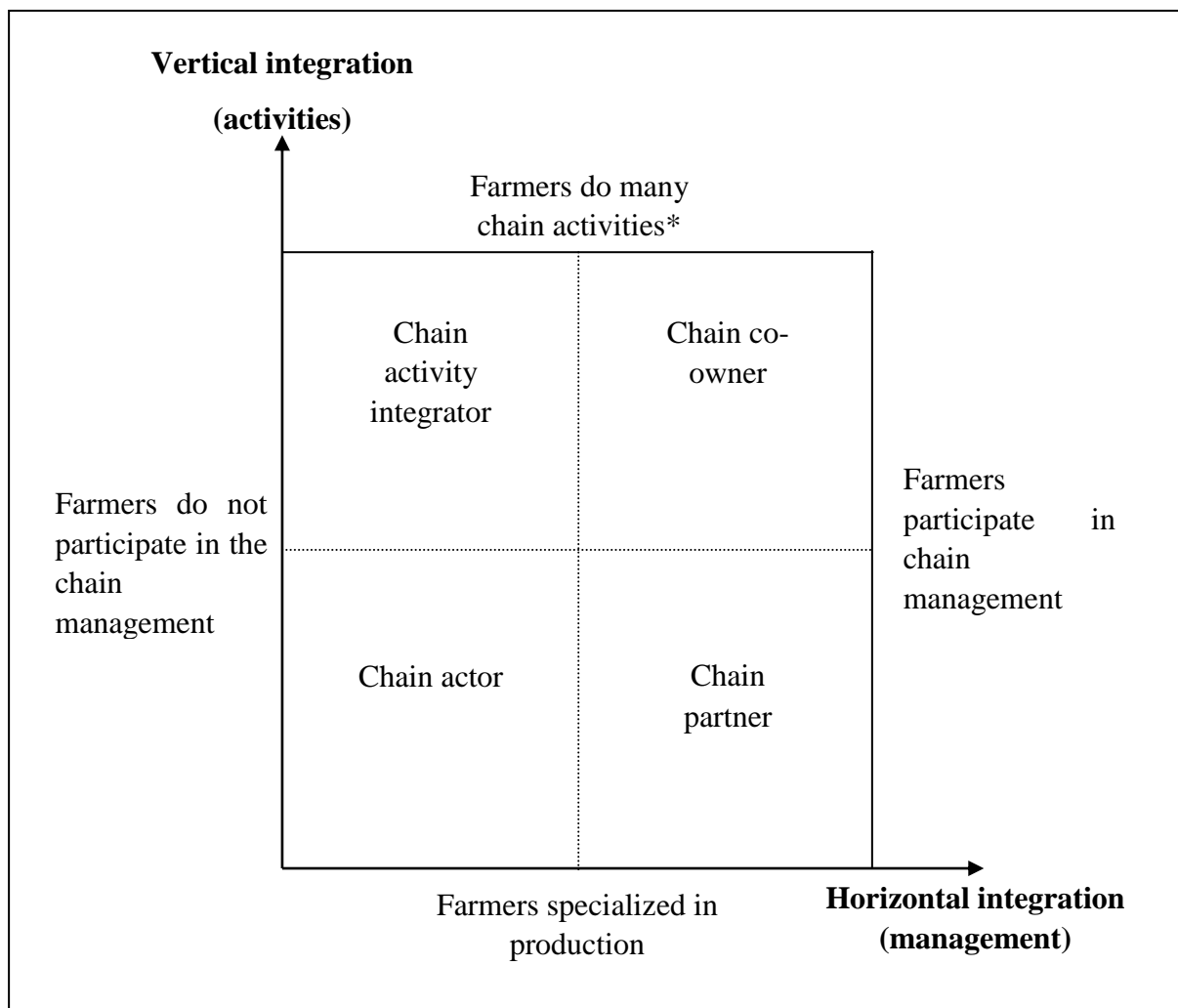


Figure 2.6-1 Form of chain participation by small farmer (KIT, 2006)

Chain co-owner is the highest position for farmers in the chain. In such a position in the chain, they have more power and contribute to the chain management, control and decisions about their products. They first join in a farmer association, then move upstream in the chain, increasing alongside their activities and influence. Chain co-owners are organized in business cooperatives to develop products for serving final customers.

2.6.3 Contract farming

Contract farming is one specific form of vertical integration (Ruhben, 1998). However, vertical integration is much broader and compasses all means of vertical harmonizing interdependent production and marketing activities that range from the market to complete integration, through various types of contract (Frank, 1992). They are usually used interchangeably (Cramer, 1988). Through a contract, the farmer is contractually bound to supply a given product quantity and quality to a processing plant or trader. The forward actor or contractor agrees in advance to pay a certain price to the farmer for their output.

SEEP AGM (2006) defined contract farming as an agreement between farmers and other actors for the production and supply of agricultural products under forward agreements, frequently at predetermined prices. This arrangement also invariably involves the purchaser in providing a degree of production support through, for example, the supply of inputs and the provision of technical advice. On the part of the farmer, he commits to provide a specific commodity in quantities at quality standards determined by the purchaser. On the part of the firms, it commits to support the technical aspects of the farmer's production and to purchase the commodity.

Contract farming started during the Japanese colonial time, in the Taiwanese sugar production sector in 1885. In the early twentieth century, it continued to develop in Central America in the banana sector. In the late twentieth century, Western Europe and North America applied contract farming in the food and fiber industries (Barker, 1972; Watts, 1994; Rehber, 1998). Nowadays, rubber, cocoa, palm oil, tea and banana plantations are managed through contract farming by transnational corporations and by state run agencies in Asia and Latin America. Ninety percent of chicken farms and twenty percent of pig farms were integrated into agro-industrial conglomerates in the United States in 1994 (Hamilton, 1994).

In general, a contract is an institution that reduces the negative effects of information and asset asymmetries across market actors, especially small farmers and those who deal with them. The contract allows all producers to reduce the transaction cost for perishable product sales in uncertain or thin markets, and to get higher prices from a buyer. It also spread the risks and captures economies of scale in inputs bulk purchases (FAO, 2003). In addition, it provides market guarantee for producers to supply raw material continuously to buyers and give opportunity to consumer to consume products with suitable prices if there are any seasonal fluctuations in basic economical factors such as supply, demand and price that usually happens in the agricultural sector (Arzu, 2006). Contract farming is therefore promoted as an institutional innovation to improve agricultural performance in developing countries under huge development project granted by World Bank and Asian Development Bank (Ghee, 1992; Glove, 1994).

Contract farming is classified into two broad categories based on contractors' motivations and goals as well as the structure and scale of operation. Setboonsarng (2008) identified five different types of contract farming based on the motivation and goals of contractors:

Socially motivated contract farming was introduced by NGOs to promote alternative agriculture systems, such as Japan's teikei system, which is capable of protecting the

environment and improving the welfare of farmers in order to reduce poverty in many rural areas.

Contract farming is utilized as a way to promote alternative or community supported agriculture by NGOs. This type of contract farming is usually applied in many supporting projects funded by foreign NGOs and Fair Trade Organisation to promote new products such as organic crops to maintain fair distribution of profit among actors in poor areas of developing countries.

Contract farming promoted by local governments is usually promoted with an arrangement where government tries to develop the agricultural sector and reduce poverty in rural areas. In contrast, firms will be encouraged to jointly participate with farmer in implementing government's goal.

Purely commercial contract farming is initiated by the needs of agribusiness firms, typically in exporting agro-products. This type of contract is purely commercial with business orientation and usually brings more income for contractors. There is no purpose of poverty reduction while creating the contract and therefore, there is no intervention of government to run the game.

Contract farming for socially responsible international trade is the combination of the above types. Firms and farmers sign this contract with an upfront identification of their responsibility and expectation to satisfy the global market and social requirements on food safety, health, social, and environmental sustainability.

Concerning the structure and scale of operation, SEEP AGM (2006) classified contract farming into two types namely, centralized and intermediated or decentralized models.

The centralized model involves a centralized firm contracting directly with a large number of individual farmers. This type of contract farming prefers high value agro-products that require more capital than labour input. It is often applied on large scale farms where farmers have high technical experiences in providing high product quality that would meet international specifications.

The decentralized model is also known as intermediated one. It is the type of contract that a firm signs with lead farmers who in turn contract with individual farmers. Lead farmers play as intermediaries and could be the leader of a farmer association or a cooperative. Eaton and Shepherd (2001) stated that the decentralized model is promoted in small scale production that do not require a significant degree of processing, such as fresh vegetables, fruits, or horticultural products that only need to be graded and packaged for resale. Production in this model typically involves minimal short-term investment.

Though there are different types of contract farming, different countries will have different structures to help contractors achieve their goals from the integration. Rehber (1998) introduced a simple nature standard structure model of contract farming in Figure 2.6-2.

In this model, contract farming might only be implemented successfully and fairly when every participant/producer/processor has consciously collaborated. Actors joining in the linkage through contract farming should look at other contractors as a partner whom they are working together rather than a rival. Both sides need to collaborate with each other to make the contractual relationship operate for their mutual benefit (Rehber, 1998).

Literatures reviewed cited that contract farming will run better by organized groups of producers due to the high market power of farmers that got from the organisation. Besides, the role of government is an important factor for successful application of contract farming. Through an effective extension service system, credit facilities, and support policies,

government can provide the technical skills as well as capital to help contractors run successfully the contract in production. Moreover, government determines a conducive legal framework for a contract and issues regulations that will solve dispute and implement arbitration when needed. Other institutions involved in the structure to support both sides in executing the contract are insurance system, non-government organisation.

A contract farming approach will involve the following steps (SEEP AGM, 2006):

- Ready market/need for targeted products
- Selection of geographic area
- Selection of contract farmers
- Signing of agreements with contract farmers
- Distribution of inputs
- Technical assistance + monitoring of production
- Procurement of production
- Payment
- Storage and shipment

In summary, contract farming is one of the most significant and powerful means by which farmers are integrated into national and international commodity markets and agro-industrial value chains. It is a continually evolving process that has been applying worldwide though it is not a panacea in solving all problems of the agricultural production.

2.6.4 Limitations of vertical integration under contract farming form

Apart from earlier discussions, vertical integration under contract farming form has its limitations as a production system.

One of its major disadvantages is the risk involved. On the other hand, vertical integration under contract farming form can increase production efficiencies through risk management. On the other hand, the form creates its own risk despite reducing the other (Rehber, 1998).

Kelley (1994) argued that one of the risks created in contract farming is the loss of the contract's premium prices from producers due to the failure to produce according to contract standard. This risk might be experienced by both sides of the contract parties, especially when the negotiated price is fixed/pre-determined and the market price, at the time of delivery, is higher or lower than the negotiated price. For some non-economic reasons, the producers might receive a risk coming from non-renewal or termination of the contract.

In some cases, farmers might lose their independence due to the contract conditions. Farmers, therefore, more or less transfer their management function to another actor. That means some skilled farmers may worsen his circumstance under conditions of the contract compared to taking his chances in the open market (Rehber, 1998).

It is obvious that a closed production system through a vertical integration under contract farming form might result in a monopsony. This monopsony actor could abuse his position by taking advantage of other actors because of some provision in the contract that are in his favor. Monopsony is usually favorable for processors while disadvantageous for farmers.

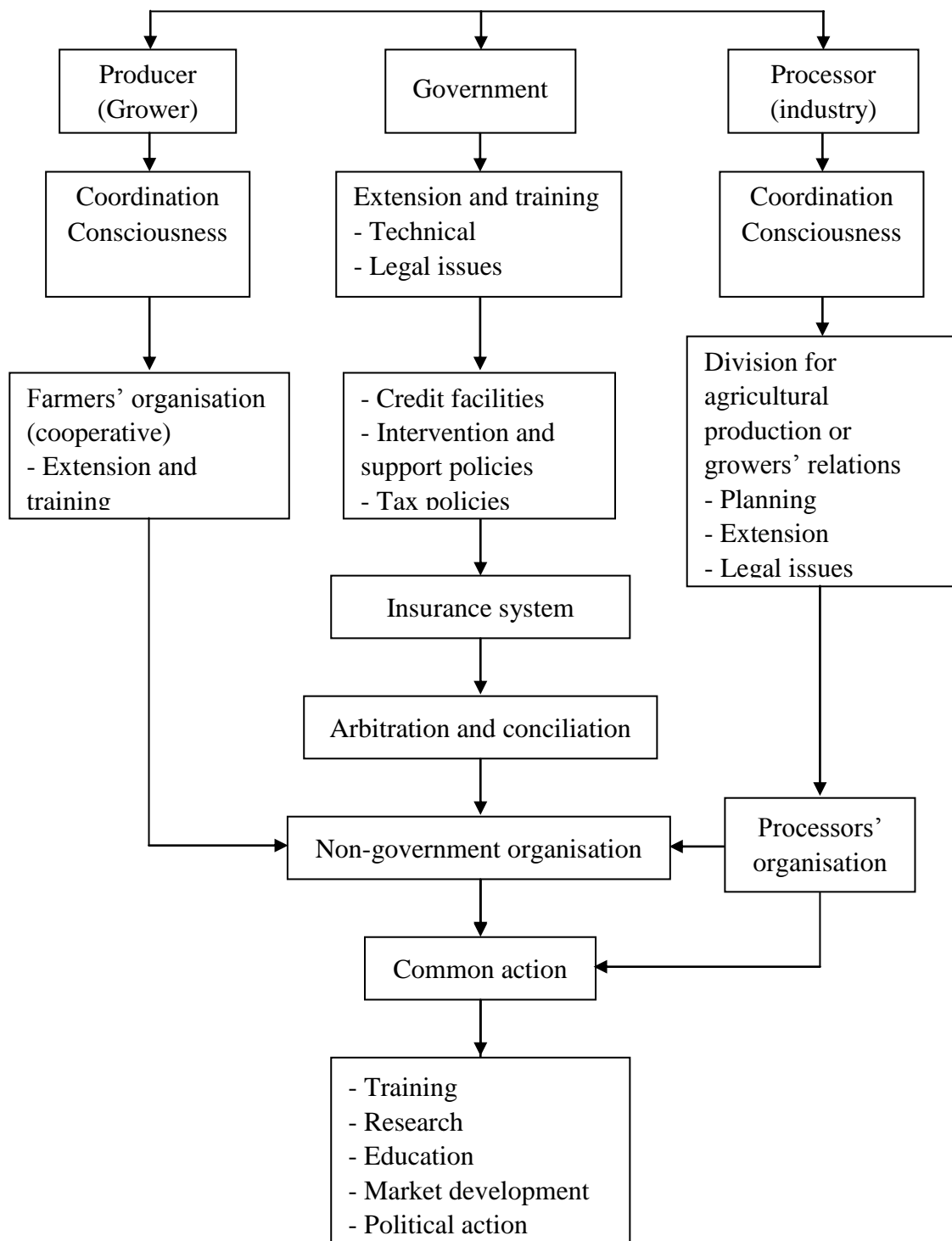


Figure 2.6-2 Structure of contract farming

2.6.5 Experiences of contract farming in the world

As mentioned in part 2.6.3, contract farming started during the Japanese colonial time in the Taiwanese sugar production sector in 1885 (Warning and Hoo, 2000). In the early twentieth century, it continued to develop in Central America in the banana sector. In the late twentieth century, Western Europe and North America applied contract farming in food and fiber industries (Barker, 1972; Watts, 1994; Rehber, 1998). Nowadays, rubber, cocoa, palm oil, tea and banana plantations are managed through contract farming by transnational corporations and by state run agencies in Asia and Latin America. Ninety percent of chicken farms and twenty percent of pig farms were integrated into agro-industrial conglomerates in the United States in 1994 (Hamilton, 1994).

Focusing on the South East Asian region, the existence and development of schemes of vertical integration under contract farming form is linked to the agriculture industrialization which has led to the development of contractual arrangements between producers and other players in the marketing chain (FAO, 2002). The regional organisation of contract farming has multiple forms of which, the contracts involving sponsors in subcontracting linkages with farmers to intermediaries are the main one. "In Thailand, for example, large food processing companies and fresh vegetable entrepreneurs purchase crops from individual "collectors" or from farmer committees, who have their own informal arrangements with farmers. In Indonesia, this practice is widespread and is termed plasma" (FAO, 2008).

The FAO (2002) reported that there was a tendency towards high vertical integration in the livestock industry with the development of larger-scale and highly controlled contracting schemes in South East Asia, of which, the contract farming shifted from small farmers to large scale holders. The case of poultry in Thailand showed that 80% of poultry production in the mid-1990s came from only ten large, vertically integrated companies supplying feed and day old chicks to medium- and large-scale producers under contract farming.

Contract farming in South East Asian is not specific for any commodity. It is presented in traditional tropical products such as sugar, rubber, oil palm in Indonesia and Malaysia, poultry, sugarcane in Thailand, and livestock in the Philippines. However, the data showed that contract farming of high-value items for export, such as asparagus, cucumbers, melons, strawberries, aquacultures usually seemed to develop better (FAO, 2008).

Vertical integration under contract farming form in South East Asia seems to be successful in some cases, but in other cases it happened to be a failure. In Thailand, the success of contract farming had linked farmers to both local and international markets. Most of the successful cases of vertical integration under contract farming form in Thailand presented the highest degree of private sector involvement and foreign direct investment. It has been a central component of the government development plan and the strategy of integrated agricultural development generated through the private sector. (FAO, 2008). It also showed that both farmers and other actors got advantages such as income stability, quality consistency, better inputs (for high value, labour intensive agricultural enterprises), and better access to credit from the achievement of the contract farming. From these experiences, Thailand and Myanmar signed a Memorandum of Understanding which permitted Thai contract farmers to get access to seven million hectares of arable land in Myanmar in order to satisfy the demand for high crop yield in Thailand while creating employment in Myanmar (United Nations Economic and social commission for Asia and the Pacific, 2006). Nowadays, Thailand is seeking to conclude similar contract-farming agreements with the other three countries in the region, namely Cambodia, Lao People's Democratic Republic and Viet Nam (United Nations Economic and social commission for Asia and the Pacific, 2006).

Apart from Thailand, however, numerous vertical integration under contract farming form failed in the Philippines, Indonesia, Malaysia and Vietnam which created many negative impacts such as unbalanced partnership, agricultural transition that might be a vulnerable to food shortages and nutritional loss, an increase in the use of pesticides with the associated environmental damage, exclusion of the poorest farmers, and the decline in reciprocal relations holding communities together (FAO, 2008).

2.6.6 Application of vertical integration under contract farming form in Vietnam

Vertical integration under contract farming form in Vietnam can be traced back in the early 2000s when the government issued decision No. 80/2002/QĐ-TTg on the policy promoting the sale of agricultural produce through contracts between state owned enterprises and farming households.

By implementing the decision, five forms of farming contracts have been applied, such as: 1) Sale contract with state processing enterprises; 2) Production contract with foreign companies; 3) Sale to private merchants by oral engagement; 4) Sale through service cooperatives; and 5) Handicraft and industrial village network. Based on the motivation and goals of contractors, these five forms present five types of farming contract classified by Setboonsarng (2008) namely socially contract farming, contract farming utilised to promote alternative or community supported agriculture, contract farming promoted by local government, and purely contract farming. Based on the structure and scale of operation, these five forms present both type of centralised and decentralised forms of contract farming.

Six months after the enactment of decision No. 80/2002/QĐ-TTg, enterprises signed contracts with farmers for one million hectares of rice land accounting for 40% rice production, 50% of tea output, 90 % of cotton and fresh milk and 70% of sugarcane output (Dao and Vu, 2005).

Up to now vertical integration under contract farming form covers almost all major agricultural products in Vietnam, such as rice, maize, cassava, coffee, rubber, pepper, cashew, sugarcane, coconut, fruit, vegetables, timbers, medical herbs, poultry, milk, shrimp, shell, pangasius. Among these products, only sugarcane, milk, and pangasius have gotten a bit successful while the rest failed.

In sugarcane production, contract farming was signed between processors and existing farmer groups or farmer cooperative. For example, Lam Son Company signed contract with farmers in Thanh Hoa province to buy more than 30 % of total output of sugarcane in the region. The existence of farmers groups or cooperative seemed helping the vertical integration to be successful in this case.

For other products like rice, vegetable, tea and poultry, the percentage of contracts being terminated or having failed was very high due to the weak legal environment, tie up between two parties was not strong enough, and the existence of fixed price mechanism.

Though contract farming has the potential to improve small farmers' welfare, it is not a sufficient condition for such improvement in Vietnam (ADB, 2005). Small farmers could not join in the vertical integration under contract farming due to other integrators' preferences to large scale production. For those who were in the game, they often transferred their power to other parties due to their weak position in bargaining conditions in the contract. They are controlled by large agribusinesses (ADB, 2005).

In brief, vertical integration under contract farming in Vietnam can be characterized by the conclusion made by the ADB (2005) as follows “It is agreed that contracts to date under Decision 80 have largely been unsuccessful. Furthermore, it is worth noting that even successful contract farming systems may hurt, rather than help, poor farmers”.

CHAPTER 3. SHRIMP PRODUCTION IN THE WORLD AND VIETNAM

3.1 SHRIMP PRODUCTION IN THE WORLD

3.1.1 Overview of shrimp production in the world

Shrimp is one of the most popular types of seafood in the world. Shrimp cultivation appeared in the world many centuries ago, but its modern production type started only in the 1930s after the Japanese researcher, Motosaku Fujinaga, performed his study on pond post larvae production with kuruma shrimp (*Penaeus japonicus*) (Shigueno, 1975; Weidner and Rosenberry, 1992). With the development of technology, post larvae production practise was fully conducted in 1964 to satisfy the demand of post larvae for shrimp cultivation which created a boom in the development of the sector in the 1990s (Rosenberry, 1998). Consequently, shrimp farms are being created thereafter in order to meet the demand of shrimp in the world with approximately five million metric tons of shrimp produced annually (WFF, 2010).

There are two main regions for shrimp cultivation in the world, the West and the East. The West includes Latin countries such as Brazil and Ecuador. The East involves South and South Eastern countries namely China, Thailand, Indonesia, Malaysia, Philippines, Vietnam, Bangladesh and India.

While the West dominates the production of the white leg (*Penaeus vannamei*) shrimp species, the East predominantly produces both the black tiger shrimp (*P. monodon*) and *P. vannamei* (Wyban, 2009). According to FAO, *P. vannamei* is the largest shrimp species cultivated in the world with about 39%. Black tiger shrimp ranks second with about 17% (Figure 3.1-1). As the fastest growing food production sector in recent years, shrimp provides acceptable protein to human consumption and supply rich supplement to wild aquatic animals and plants (Kanda, Challa *et al.*, 2011).

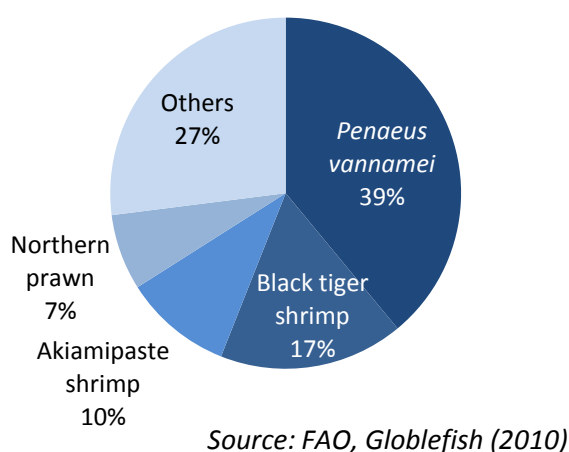


Figure 3.1-1 Shrimp production by main species

According to Fuchs *et al.* (1999) and Rosenberry (1998), Asia is the leader in shrimp farming which accounts for almost 80% of world shrimp production. The majority of farmed shrimp is exported to the United States, European Union and Japan. The growth of shrimp production has generated substantial income for developing and developed countries, particularly in Asia and the Americas due to the high preference of rich consumers. Shrimp becomes a strategic export product because of its high export value to many countries such as Vietnam, Thailand, Indonesia, Bangladesh and India.

Shrimp farms also exist in Africa with the most famous one located in Madagascar. Shrimp production in Africa is less developed than in Asia and Latin America. Nevertheless, most of the farms in potential areas have the support of NGOs such as Shell Petroleum Company in Nigeria (European Commission, 2002).

Aside from its big contribution to the world economy, the rapid development of the shrimp sector has also created many negative impacts where no solutions such as water pollution, shrimp disease, loss of livelihood and deprived households (The Third World Network, 2012).

3.1.2 Shrimp production, producers and products

Shrimp production sector has developed rapidly since the 1980s due to the growth of international demand for shrimp products (Csavas, 1995; Arquitt, 2005). Asia, Latin America and some countries having the natural resource and climate condition for shrimp cultivation seized their opportunities to develop shrimp farming. Consequently, the share of shrimp farming in total world shrimp supply had risen from 5% in 1982 to 30% in 1994 and more than 40% in 2009 (Flaherty, 1999 and the Fish Site, 2009). In term of volume, this sector increased from about one million tonnes in 2001 (Tran, 2003) to almost 2.5 million tonnes in 2004 and 3.3 million tonnes in 2011 (Table 3.1-2). Compared with the year 2001, the sector had increased 250% in 2004 and 330% in 2011 respectively.

The largest share of shrimp aquaculture presents is accounted by Southeast Asia with more than 50% of total world production. The shrimp production of China ranks the second with 20% of total world shrimp aquaculture followed by the Americas with Brazil, Ecuador, Mexico, Columbia, Venezuela and Honduras.

The year 2008 marked the highest growth of shrimp aquaculture production in the world since official world data were recorded with about 3,399 thousand tonnes. Almost all regional groupings had successfully contributed to this achievement except India and Bangladesh where black tiger shrimp farms had been seriously damaged by the cyclone *Aila* virtually wiping out production (Globefish, 2009).

According to FAO, GOAL and the World Bank (2011), the growth of shrimp aquaculture in the period 2005-2009 remained positively in Southeast Asia, China, the Americas and the Mideast with 6.3%, 10.6%, 5.7% and 3.1%, respectively (Figure 3.1-1). During this period, the shrimp disease problem caused shrimp growth rate in India and Bangladesh register a deficit of 0.4%.

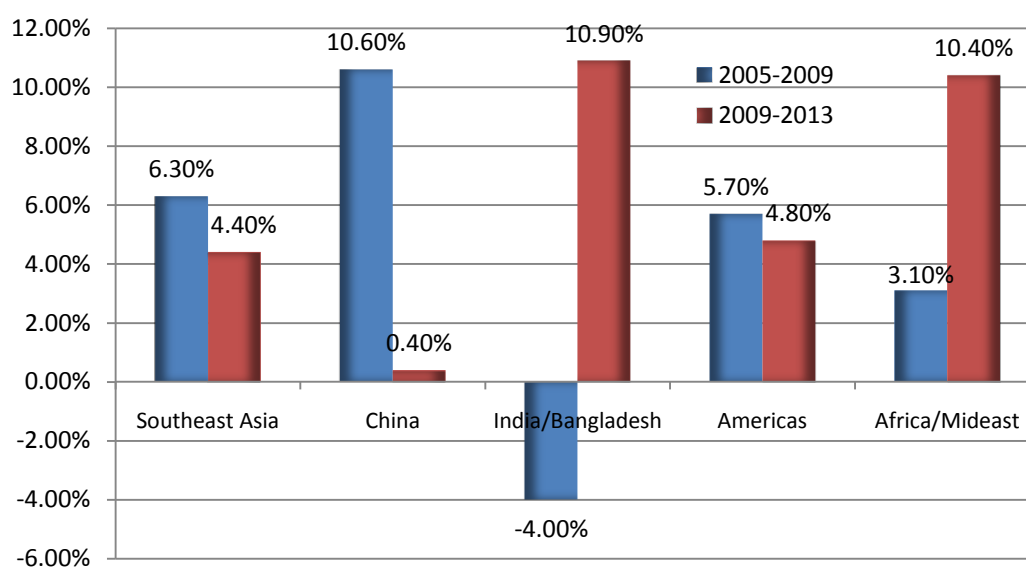
Table 3.1-1 Shrimp aquaculture production by major producing regions

Unit: 1000 tonnes

Region	2004	2005	2006	2007	2008	2009	2010	2011
Southeast Asia	993.1	1,150.6	1,333.6	1,357.2	1,463.0	1,342.6	1,449.4	1,574.9
China	936.0	1,065.0	1,080.5	1,265.6	1,268.1	1,181.1	899.6	962.0
India/Bangladesh	191.1	206.2	209.0	171.3	153.8	181.3	204.2	222.7
Americas	332.1	377.0	455.2	451.2	474.3	478.7	465.6	499.3
Africa/Mideast	25.5	26.8	27.8	26.6	30.1	25.0	27.5	30.0
Other	7.6	10.0	11.8	9.5	9.7	15.0	16.0	16.0
Total	2,485.4	2,835.6	3,117.9	3,281.4	3,399.0	3,223.7	3,062.3	3,304.9

Sources: FAO (2010), GOAL (2011, 2010, 2009). Notes: China data include both marine and freshwater production of *P. vannamei*.

Impacted by the economic crisis in 2007-2008, the purchasing power of shrimp decreased due to higher price of relative products as well as service, and therefore fewer customers go to restaurant. Shrimp prices went down and the sector suffered a decrease in both demand and price. Many producers reduced their production due to the higher production cost. Consequently, shrimp production decreased in many countries in the year 2009 (table 3.1.2-1). Nevertheless, the softening of the economic crisis and the stronger demand for shrimp in the world market in the beginning of 2010 had created a new increase in shrimp production in the following years. Statistical reports from FAO, GOAL and the World Bank (2011) forecast that the growth of shrimp aquaculture in the world will be a surplus in the period 2009-2013 (Figure 3.1-2).



Source: FAO (2011), GOAL and World Bank (2011)

Figure 3.1-2 Shrimp average annual growth rate by major producing regions

Focusing on Asia and Latin America, two main regions of shrimp production in the world, China, Thailand, Vietnam, Indonesia lead production in Asia while Ecuador, Mexico, Brazil and Colombia are the leaders in Latin America. Shrimp production of China accounts for about 30% (962,000 tonnes) of total shrimp production of the region, Thailand ranks in second with about 27% (553,200 tonnes). This is followed by Vietnam and Indonesia with 16% (403,600 tonnes) and 15% (390,600 tonnes) respectively (Table 3.1-2).

Shrimp production in Asia and Latin America kept growing continuously during the period 2004-2008. When the economic crisis occurred in 2007, almost all countries were strongly affected with the consequent reduction shrimp production volume, especially in Vietnam and Indonesia.

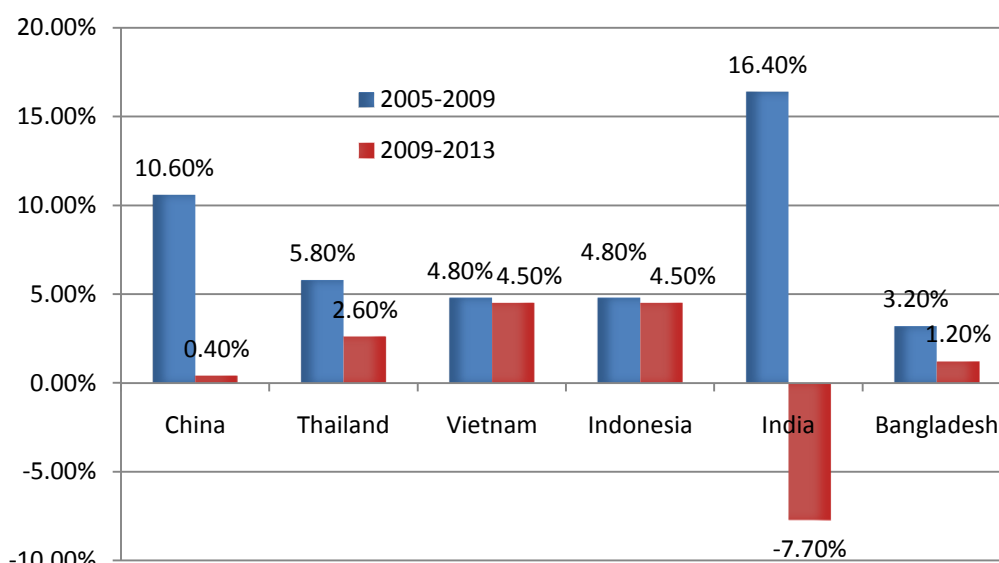
Table 3.1-2 Shrimp production estimates in Asia and Latin America

Unit: 1000 tonnes

Region	2004	2005	2006	2007	2008	2009	2010	2011
China	935.9	1,064.9	1,080.5	1,265.6	1,268.1	1,181.1	899.6	962.0
Thailand	360.3	401.3	500.8	504.9	507.1	542.0	548.8	553.2
Vietnam	275.6	327.2	349.0	376.7	381.3	302.4	357.7	403.6
Indonesia	238.6	279.5	339.8	330.2	408.4	299.0	333.9	390.6
India	133.0	143.2	144.3	107.7	86.6	76.3	94.2	107.7
Bangladesh	58.0	63.0	64.7	63.6	67.2	105.0	110.0	115.0
Asia Total	2,001.4	2,279.1	2,479.1	2,648.7	2,718.7	2,505.8	2,344.2	2,532.1
Ecuador	89.6	118.5	149.2	150.0	150.0	140.0	145.0	148.0
Mexico	62.4	90.0	112.5	111.8	130.2	130.0	91.5	120.0
Brazil	75.9	63.1	65.0	65.0	65.0	65.0	72.5	82.0
Colombia	18.0	19.0	21.6	20.3	20.3	20.1	16.5	15.0
Honduras	18.0	20.9	27.0	26.3	26.6	20.0	30.8	22.0
Venezuela	23.0	13.0	21.2	17.7	16.0	18.0	20.0	15.0
Latin America Total	286.9	324.5	396.5	391.1	408.1	393.1	376.3	402.0

Sources: FAO (2010), GOAL (2011, 2010, 2009). Notes: China data include both marine and freshwater production of P. vannamei.

With the strong increase of shrimp production in 2004-2009, the growth of the shrimp sector in China, Thailand, Vietnam, Indonesia, India and Bangladesh registered a surplus. This is projected to continuously increase through the period 2009-2013, except in India. The serious problem of shrimp disease in India is expected to negatively impact its shrimp production in the period 2009-2013 (Figure 3.1-3).



Source: FAO , GOAL and World Bank (2011)

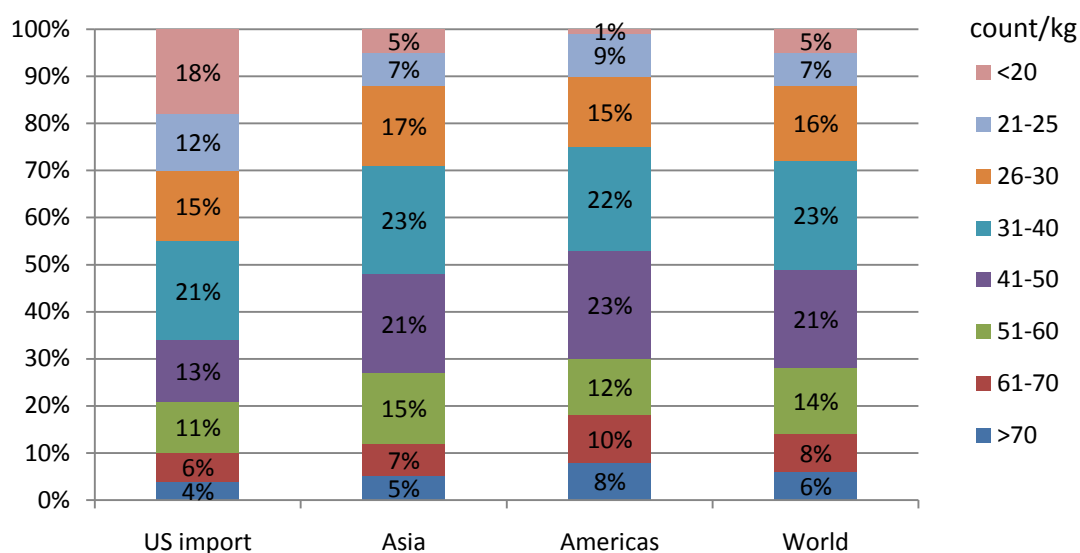
Figure 3.1-3 Average annual growth rate of shrimp aquaculture in Asia

Taking into account shrimp aquaculture products, there are from two main species, the black tiger (*P. monodon*) and the white leg (*P. vannamei*). There is a tendency in changing the species from black tiger, which dominated shrimp aquaculture by 2002 (World Bank, 2002; Tran, 2003), to the white leg in 2010 (GlobeFish, 2010) due to the serious disease of *P. monodon*. From the main species cultivated in Latin America, white leg shrimp now exists in every shrimp production countries such as Southeast Asia and China.

As a product traded by size and type, shrimp products vary from 20 count/kg to 70 count/kg. The bigger sized shrimp will give the higher price. In 2010, shrimp with the size of 31-40 head/kg was the most cultivated in the world with about 23%. Ranking in second is the size of 41-50 count/kg. The bigger sized shrimp of 26-30 count/kg accounts about 16%. Big shrimp sizes of < 20 count/kg were less cultivated due to its high price and preference to export to strict importers such as the US which accounts for 18% of import volume (Figure 3.1-4).

In Asia, the size of shrimp aquaculture was suited to the size of the world shrimp cultivation in term of the percentage. Shrimp production was focused on the sizes of 31-40 count/kg, 41-50 count/kg, 26-30 count/kg and 51-60 count/kg. This trend is similar in Latin America countries.

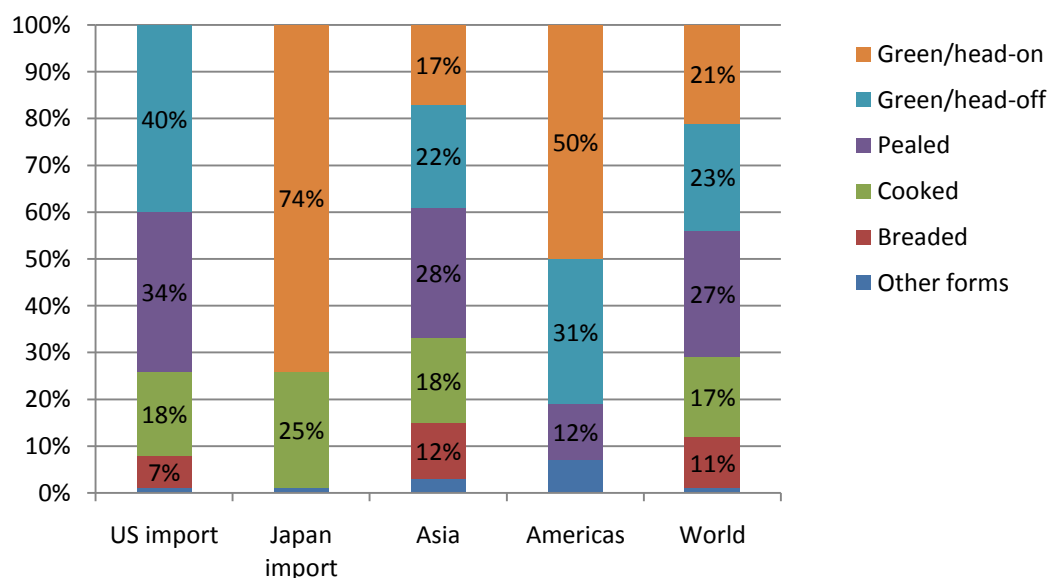
It is evident that the size of shrimp aquaculture cultivated in the world depends on the demand of customers. The shrimp production by size categories of the world shown in the Figure 3.1-4 reflects the import size in the US market.



Source: GOAL and World Bank (2011)

Figure 3.1-4 Shrimp production by size categories, average 2010

Focusing on product form, the world peeled shrimp constituted about 27% of total production in 2010, occupying the largest share in shrimp producing form in Asia (28%). Green/head-off accounts for about 23% where a large volume was exported to the US. On the other hand, Japanese customers prefer shrimp green/head-on (74%), however this type of shrimp was produced less than peeled and green/head-off forms (Figure 3.1-5).



Source: GOAL and World Bank (2011)

Figure 3.1-5 Shrimp production by product form, average 2010

3.1.3 Shrimp trade in the world

Along with the increase in world production of shrimp aquaculture and the favourable economic conditions, shrimp trade had expanded sharply since the early 1980s (Walter, 2008). The world shrimp market is mostly supplied by Asian, South American and Central American producers. In Asia, Thailand, Vietnam, China, Indonesia and India sell their products to all the consumers in the world with a largest share going to the United States, Japan and European Union. Most of shrimp produced in South America and Central America is exported to the United States and European Union (Walter, 2010).

Japan, one of three largest shrimp importer in the world had reduced their import since the 2007 due to the impact of the economic crisis when the world shrimp price was higher. Almost all exporters decreased their export volume to this market. Thailand, Vietnam, Indonesia, India and China are the main suppliers of shrimps in Japan with about 16.20%, 20.3%, 17.6%, 12.3% and 7.5% respectively in 2009 (Table 3.1-3).

Table 3.1-3 Import shrimp of Japan

	2006	2007	2008	2009	...Jan-Jun...	
		1000 tonnes			2009	2010
Thailand	20.1	26.4	24.9	32.1	14.1	17.6
Vietnam	51.1	40.0	42.2	39.9	14.0	16.3
Indonesia	43.7	37.1	37.4	34.8	17.3	15.7
China	22.8	24.0	16.8	14.9	5.4	5.5
Malaysia	3.1	4.2	4.5	5.1	2.4	3.1
Philippine	5.3	4.3	3.5	4.0	1.7	1.4
Myanmar	na	na	6.8	6.7	2.1	2.7
India	28.5	27.0	24.0	24.3	9.2	9.1
Bangladesh	na	na	3.1	2.4	1.5	1.4
Russia	9.5	8.9	7.8	7.1	4.5	4.4
Canada	8.7	7.6	7.7	7.2	3.9	3.4
Greenland	6.8	5.4	5.6	6.5	3.9	2.2
Argentina	na	na	2.6	3.6	na	na
Others	30.4	22.4	9.7	9.0	4.6	4.2
Total	230.0	207.4	196.6	197.6	85.2	86.4

Source: GLOBLEFISH AN 10127

Globlefish (2009) also remarked that the H1N1 flu alarm has created mixed trends in the Japanese market. People were avoiding going out and Japanese consumers preferred to eat at home rather than expensive dining out, resulting to very limited restaurant demand. On the other hand, the demand for frozen shrimp bought at supermarkets to cook at home increased. With the economic recovery, shrimp trading in the Japanese market seemed to brisk up at the

beginning of 2010. However, the earthquake disaster accompanied by the tsunami in Japan in 2011 created a new negative point of shrimp trade in the country.

Similar to the Japanese market, import of shrimp by the United States also decreased following the impacts of the economic crisis. The import volume reduced 2.8% in the year 2009 (54,500 tonnes) compared with 2008 (564,200 tonnes) (Table 3.1-4).

Most of the shrimp sold to the US came from Asian countries such as Thailand, Indonesia, Vietnam, China, Malaysia, India and Bangladesh which comprised about 70% of total shrimp imports in 2009. Market share of shrimp from Latin American countries was about 25% in 2009.

Table 3.1-4 Import shrimp of the United States

	2003	2004	2005	2006	2007	2008	2009
	1000 tonnes						
Thailand	133.2	132.1	160.9	193.7	188.3	182.4	190.4
Indonesia	21.7	47.0	52.6	58.7	59.1	84.0	69.3
Vietnam	57.4	37.1	42.9	37.1	39.3	47.9	41.6
China	81.0	66.0	45.2	68.2	48.4	47.8	43.8
Malaysia	1.3	12.7	17.2	20.3	22.8	30.1	18.4
India	45.5	41.0	35.7	27.3	20.8	15.2	19.8
Bangladesh	8.1	17.4	15.8	19.4	14.9	13.8	9.9
Ecuador	34.0	37.5	49.6	59.4	59.1	56.3	61.5
Mexico	25.5	29.0	28.1	35.4	40.6	41.1	34.5
Brazil	21.8	9.2	3.0	0.6	na	na	na
Guyana	11.4	8.4	8.6	7.8	8.9	9.1	8.9
Venezuela	10.0	16.3	11.4	9.9	10.8	na	na
Others	53.6	63.9	57.8	52.5	43.9	20.5	18.1
Total	504.5	517.6	528.8	590.3	556.9	564.2	548.5

Source: GLOBEFISH AN 10129, NMFS and VASEP news 2010.

Indonesia, the second largest supplier of the US market continuously increased their export volume in the period 2003-2008. Since then, the impact of the economic crisis and the serious problem of shrimp disease, decreased their market share in the US while Thailand took this opportunity to increase their volume.

Globefish (2010) explained that, the Gulf of Mexico oil spill problem was overshadowing the US shrimp market in 2010. The shrimp price was very high due to the reduction in domestic shrimp production. Consequently, the US reduced its import volume about 4%.

The European Union, one of the strictest markets for world shrimp exports has been ranked as the largest market import in the world since 2006 (Globefish, 2008). In 2007, the EU registered a new record import of 616,000 tonnes of shrimp from outside of its continent. The grand total shrimp imported by the EU, including intra-EU imports, reached the remarkable

figure of 838,000 tonnes in the same year on both fresh/frozen and prepared/processed products. This figure reached 1,076,000 tonnes in 2009. Shrimps imported by EU originated from every shrimp producing region, Asia, Latin America, and Africa for instance (Table 3.1-5).

Table 3.1-5 Import shrimp of the EU 27

	2009	...Jan-Jun...		
		2008	2009	2010
	1000 tonnes		1000 tonnes	
Fresh/frozen (HS030613/.030623)				
Ecuador	68.6	32.5	28.6	35.0
India	56.9	21.8	25.1	21.2
Greenland	47.5	20.9	20.4	19.9
Thailand	27.7	6.7	8.4	15.7
China	36.0	16.4	14.4	14.9
Bangladesh	31.6	12.5	12.3	12.5
Argentina	47.0	8.5	13.9	11.5
Vietnam	24.9	7.5	6.2	9.3
Indonesia	14.0	8.5	6.6	5.5
Colombia	13.7	5.3	5.6	5.5
Canada	8.2	8.6	5.3	3.9
Subtotal	471.1	190.8	182.1	184.5
Prepared/process (HS160520)				
Thailand	23.4	6.4	9.7	11.8
Canada	23.6	9.1	12.1	11.4
Greenland	24.1	11.5	11.3	11.0
Iceland	10.6	7.2	4.9	4.9
Indonesia	10.9	4.4	4.9	4.6
Vietnam	9.4	3.4	3.1	4.2
Norway	8.0	4.6	3.8	3.8
Subtotal	133.8	58.0	60.9	64.8
Grand total	604.9	248.8	243.0	249.3

Source: GLOBLEFISH (2010)

Ecuador, India, Greenland, Thailand, China, Bangladesh, Argentina and Vietnam are the major suppliers for fresh/frozen shrimp in the EU of which Ecuador comprised 14.6% of the market, India 12.1%, Greenland 10.1% and Argentina 10%.

United Kingdom, Germany, France, Spain, Italy are the main destination of shrimp export to EU. Shrimp imports of Spain decreased strongly due to the severe impact of the economic crisis impacts in the country. The rest of the EU importers took advantage of the low shrimp prices experienced in 2009, with overall imports being stable.

3.1.4 Shrimp price

Shrimp price in the world market are based on the existing domestic prices in the three main importing countries, namely the US, Japan and EU.

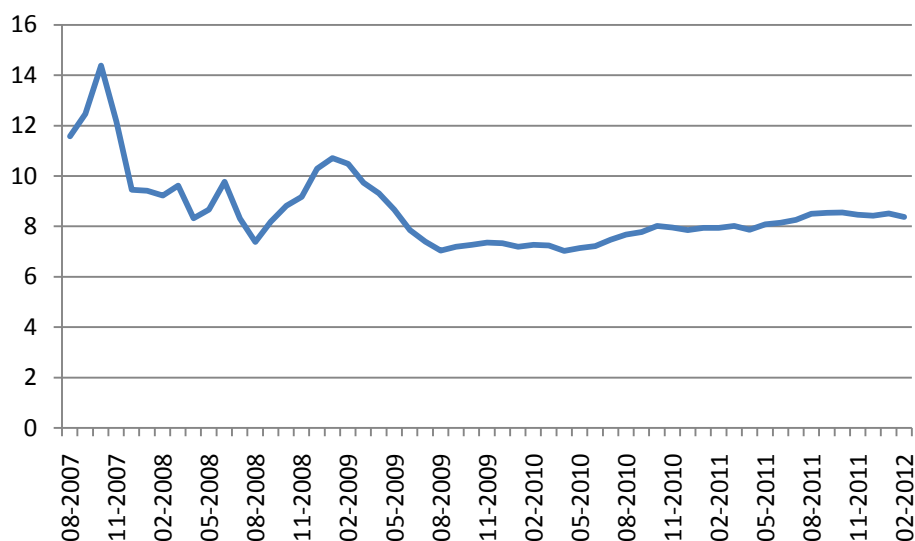
Apart from the supply volume factor, shrimp price are also strongly affected by the currency, exchange rate of the importing countries, occurrence of shrimp disease and environmental problem in producing countries, and unexpected events such as the economic crisis or a natural disaster.

The strong development of shrimp aquaculture in the years 1980s-1990s supplied a very large volume of shrimp products in the world market. Shrimp aquaculture achieved higher yield creating a large supply to help meet the demand of customers. On one hand, it reduced the production cost of producers and on the other hand, it created a new tendency of reducing shrimp price in the international market. Nevertheless, the shrimp industry has exhibited considerable instability and price volatility throughout the market system.

Shrimp price in the period 2007-2010 has been seriously affected by the world economic crisis which started at the end of 2007. There were fewer people going out for dinner which made the shrimp supplied to restaurant to decline due to higher service price. Furthermore, alert on bird flu in Asian countries such as Japan and Hongkong made people avoid going outdoors. Sharp cut backs in consumer purchases were observed within this period. Prices had declined and exporters had difficulties selling at the moment.

Price of shrimp in the US market, for example, had declined by 39% from 11.58 USD/kg in August 2007 to 7.04 USD/kg in August 2009 (Figure 3.1-6). The increase in anti-dumping duty on Thailand shrimp made the shrimp import price in the US increase by 31% in January 2009 (10.71 USD/kg) compared with August 2008 (7.38 USD/kg).

Since 2010, the economic crisis seemed to lessen and the demand for shrimp has likely become stronger. Currently, available shrimp supply is limited in the world market due to an earlier reduction in the production volumes of many countries due to the low price in 2008 and 2009. The prices of shrimp started rising again in October 2010 (8.02 USD/kg) and February 2012 (8.37 USD/kg).



Source: Indexmundi (2012). Shrimp shell-on headless, 26-30 count per kg, USD/kg

Figure 3.1-6 Trends in the US shrimp import price

3.1.5 Techniques of shrimp aquaculture in the world

Starting in the 1960s and 1970s, shrimp cultivation was widely introduced into aquaculture to develop its commercial production in the world. The improvement of hatchery and feed processing encouraged an improvement in the shrimp farming techniques that made a “blue revolution” in shrimp yield in the 1980s (Quarto, 1998). These new shrimp cultivation techniques resulted in an explosive expansion in coastal areas devoted to shrimp production throughout Asian and Latin American countries.

However, the EU (2002) explained that it is difficult to go in detail on the techniques used due to a discrepancy between official and practical criteria, mainly on a trend in intensification. Normally, the intensification level depends on the technical criteria, which is concerned in stocking density, feed, supply, and in the modes of organisation.

Currently, Khan (2011) indicated that, on the basis of intensity, shrimp cultivation could be classified into five types such as:

- Extensive
- Improved extensive
- Semi-intensive
- Intensive
- Super-intensive

On the basis of culture system, shrimp cultivation can be grouped into three types such as:

- Traditional
- Improved traditional
- Continuous stocking and harvesting

On the basis of investment, it can be grouped into two types, namely:

- Large scale
- Small scales

On the basis of construction, there are two types, namely:

- Pond culture
- Raceway culture

On the basis of integration of different crops and forest, there are two types, namely:

- Shrimp-rice
- Shrimp-forest

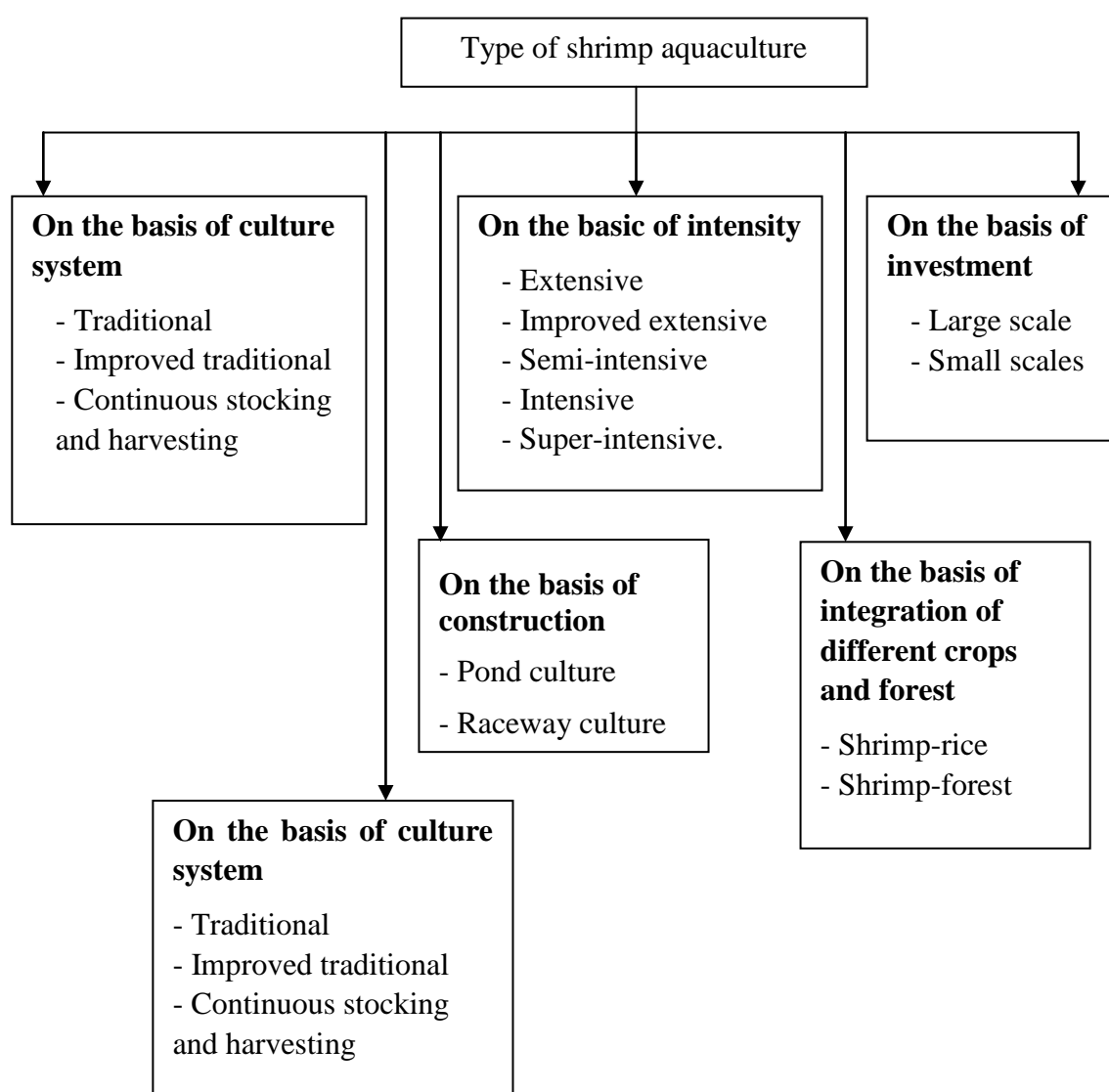


Figure 3.1-7 Types of shrimp aquaculture in the world (Khan *et al.*, 2011)

The main characteristics of shrimp cultivation in Asian countries are farming diversity involving shrimp species, farming systems and production practices. This diversification exists in Thailand, Vietnam, Indonesia, and Philippines. Although not exclusively, in the later part of the 1990s and the beginning of 2000s, Thailand was intensive in nature, while Vietnam and the Philippines, as well as India and Bangladesh, were characterised by an extensive development (EU, 2002). At that time, 70-80% of Thai farms were small scale. Nowadays, the intensive type of shrimp production has developed strongly in Vietnam, Indonesia and the Philippines while other types still exist.

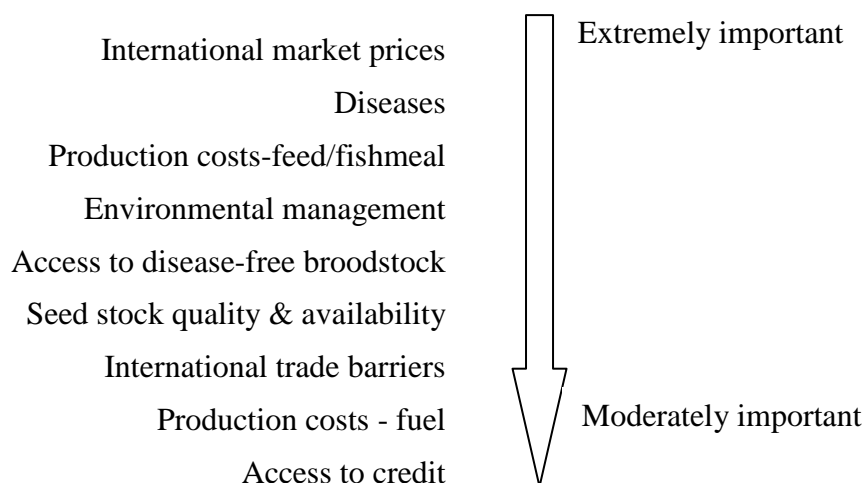
Comparing to Asia, shrimp cultivation in the Americas lacks of the traditional type and is less developed than the East. Shrimp cultivation in this region is mainly semi-intensive systems in a large area which is about 100-500 hectares/farm (EU, 2002).

In term of stock density, shrimp cultivation raises stock between 9-40 seed/m² depending on the type of farm. Shrimp crop depends on the climate condition and technical skill of producers. It is usually 2-2.5 crops/year with the yield amounting to 1,000-4,000 kg/ha. The total land area and the number of farms are much greater in Asia than in the Americas while the average farm size in Asia is 4.4 hectares as compared to 8-15 hectares in the Americas (EU, 2002).

3.1.6 Issues and challenges in world shrimp aquaculture

The rapid development of shrimp culture in coastal agricultural areas brought a very positive benefit for consumers in the world in terms of food nutrition. However, it has created many issues and challenges that still need to be solved in order to improve the sector.

According to Valderrama (2011), the top issues and challenges in shrimp aquaculture in the world in the current period are as follows:



The instability and volatility of international prices throughout the market system is listed in the top of extremely important challenges that shrimp players have to face. Experiences showed that, the downward movement of shrimp price in the market had led many producers to give up their cultivation in Asia countries such as Vietnam, Indonesia and Bangladesh. The volatility of shrimp prices affects not only shrimp producers but also shrimp exporters, and importers as well as consumers.

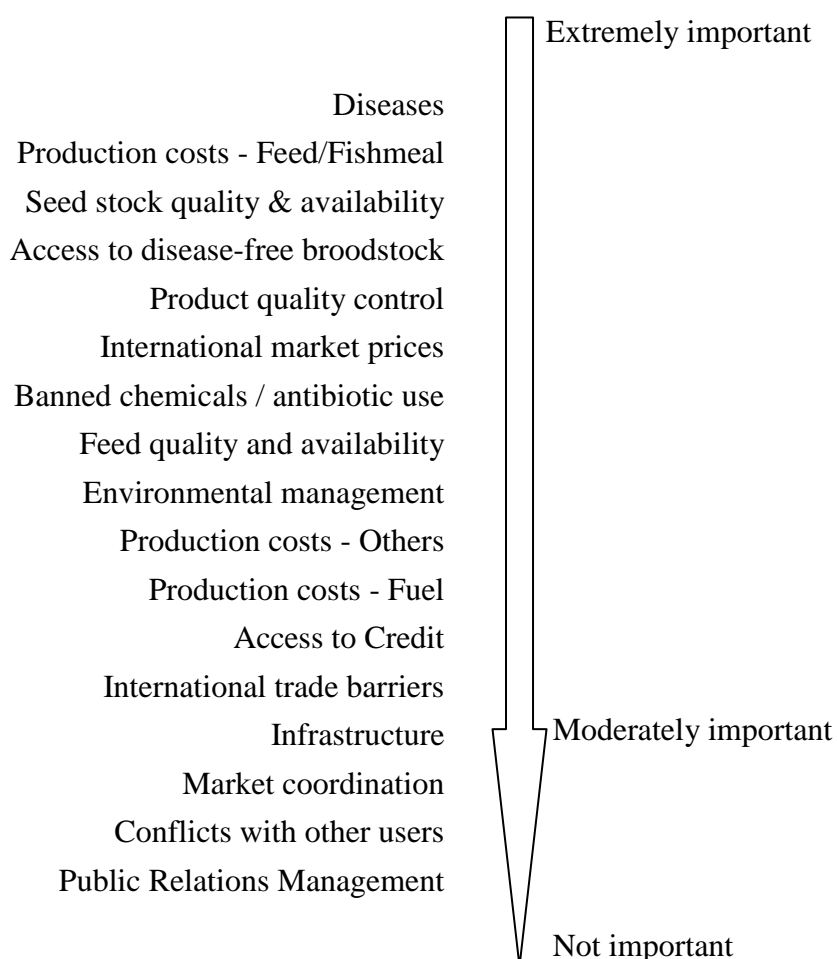
Apart from price, the occurrence of disease is a very serious issue for shrimp aquaculture in Vietnam, Indonesia, Bangladesh and India. Disease problem had strongly reduced shrimp aquaculture production in these countries over the past years. It continues impacting on the sector since no effective treatment has been found.

The results of the economic crisis are still there though it seems to have moderated. Prices of inputs for shrimp culture are continuously increasing making production cost to rise.

Environmental management of shrimp farming is still an issue though it has been addressed and studied. Deterioration of mangrove ecosystems, salt water intrusion, misused ponds and sanitary risk contribute to the unsustainable nature of shrimp farming.

Access to disease-free broodstock, seed stock quality and its availability, international trade barriers, production costs with fuel and access to credit have been the major issues and challenges of shrimp aquaculture in the world.

In Asia, the following issues and challenges were ranked according to importance (Valderrama, 2011):



3.1.7 Trends in world shrimp production

The world shrimp was estimated to decline due to the reduction of production in two the two main exporters, namely Vietnam and Thailand in the near future. The heavy floods in late 2011 made shrimp production to decline in the southern province in Thailand while the occurrence of shrimp disease in Vietnam made a lost in the MRD in the early 2012.

Supply shortages and the recovery of the world economics after the crisis will lead to increase prices for shrimp in the various markets in the world. However, many consumers are still cautious about spending, the preference of shrimp consumption has changed with more people buying shrimp from supermarkets for home preparation rather than eating in restaurants. Therefore, overall the shrimp market will be positive as reflected by increasing imports into the EU major markets, Japan and the US.

The black tiger shrimp market remained strong though the market share of the white leg shrimp has increased in Japan and the EU.

The form of shrimp will mainly prefer medium size of the raw black tiger and the raw white leg shrimp as well as processed shrimp products.

3.2 SHRIMP PRODUCTION IN VIETNAM

3.2.1 History of shrimp sector in Vietnam

Vietnam is a tropical climate country with more than 3,260 km of coastal line that suitable for shrimp culture development. According to Phillips (2004) shrimp production started more than hundred years ago in Vietnam. Shrimp culture existed in both North and South of Vietnam in the form of extensive cultivation with farming area located in the brackish water in the Mekong River Delta reaching 70,000 hectares and 15,000 hectares in the North by 1975 (UNDP, 1974; Tran, 2006).

Shrimp culture in the period has low production attributed to natural seed without feeding. Hatchery research on artificial breeding of several species including *P. merguensis*, *P. semisulcatus*, and *P. japonicus* has been undertaken without success in nursery in 1971 (Tran, 2006).

Following the development of shrimp culture in the Asian region, shrimp culture in Vietnam entered into a new stage in 1987 after the successful breeding study on *P. monodon* species as well as the economic reform of the country (Vu, 1989). It expanded strongly for trade purposes by using the model of shrimp intensive production in the 1990s (Pham, 1999; Tran, 2003).

Shrimp was mainly exported to the Japanese market with which accounts for 80% at that time. About 100 Sea Products Import and Export Companies (SEAPRODEX), which were established in 1978 till the 1990s, were in charge of international trade activity of the sector.

In the period 1986-1990, after financial assistance under a non-market economy was terminated which forced exporters to source private capital and government allowing producers to directly export to importers, SEAPRODEX's expanded strongly their trade activities which served as a precedent to a new boom development in shrimp aquaculture.

In order to support trade activities, the government allowed establishment of the Vietnam Association of Seafood Exporters and Producers (VASEP) in 1998. This association includes

Vietnamese seafood producers and exporters and companies providing service to the seafood sector. VASEP has the responsibility to support members to improve capacity, quality and effectiveness in their business as well as link them to raw material sources, broaden markets and strengthen competitiveness of Vietnam seafood products, contributing to the development of the Vietnamese fisheries sector where shrimp subsector is one part.

The year 2002 marked as the most important point of shrimp aquaculture development in Vietnam when the government issued Decree No. 09/2000/NQ-CP allowing farmers to convert less productive rice fields, uncultivated areas, and salt pans into ponds for aquaculture. Shrimp aquaculture increased dramatically with a large expansion of culture area in the whole country.

After seven years of implementing the policy, Vietnam became a big shrimp exporting country and ranked in top ten shrimp exporters in the world. Nowadays, most of shrimp culture area are located in three main regions namely Mekong River Delta, Central Coastal Region, and Northern Vietnam with two major shrimp species for cultures in Vietnam, the black tiger shrimp (*P. monodon*) and the white shrimp (*P. vannamei*), of which, the black tiger shrimp contributing the largest share in total production of the shrimp sector.

3.2.2 Current status of Vietnam shrimp production

Shrimp production

Vietnam is one of the top shrimp producers in the world. The development of shrimp culture in Vietnam was affected strongly by the expansion of shrimp aquaculture in Asian coastal area in the 1990s. Besides being a rice-base export country, Vietnam also switched to fishery export orientation and rapidly shifted to become one of the top ten shrimp exporters in the world.

In the late 1980s and early 1990s, Vietnamese farmers started shrimp culture based on the natural recruitment of the wild post larvae coming in with the tide. The shrimp production's annual growth rate was a surplus of least 4% during the period 1990-1999 except in the years 1996 and 1997 when shrimp disease seriously dominated production. With the high promised potential of a long coast line, Vietnam exploited a large area for shrimp culture in the Central coastal provinces, especially since the decree issued by the Vietnamese government in 2002 allowed farmers to convert the low production rice fields into shrimp ponds. A large part of land has been converted into shrimp ponds, including low yield rice fields and land of salt pans and other uses due to the change in the policies of the government on land uses. Consequently, the area and production of aquaculture have steadily increased for the last ten years (Table 3.2-1).

Following the example of Central coastal provinces with the encouragement of companies producing inputs (feedstuff, brood-stock, chemical, drugs), shrimp farmers in the Mekong Delta started to stock the black tiger shrimp (*P. monodon*) in their ponds. Shrimp culture expanded throughout the area in the later 1990s with water surface area growing from approximately 90,000 ha in 1991 (Vo, 2003) to almost 340,500 ha in 2000, and 516,200 hectares in 2002; 533,200 hectares in 2005; 652,000 hectares in 2010.

Comparing with the year 1991, shrimp aquaculture of Vietnam enormously grew by 278% in 2001, 544.9% in 2003 and 624% in 2010. One year after applying the new policy issued by the government in 2002, the growth of water surface area was 12.4%. This figure increased to 26% in 2010.

Sea and brackish water are the main types of water for shrimp aquaculture in Vietnam which account for about 95.2-99% of total water surface during the period 2000-2010. Area for fresh water accounted for a very small part of about 4.8% in 2000 and 1% in 2010 (Table 3.2-2). The domination of sea and brackish water suits the existence of black tiger shrimp variety *P. monodon* raised in the Mekong River Delta which is the main species in shrimp production in Vietnam though the white leg shrimp *P. vannamei* has been recently developed in some locations.

Strong increase in production area created a rapid increase in production from 32,700 tonnes in 1990 to 93,500 tonnes in 2000; 237,900 tonnes in 2003 and 450,300 tonnes in 2010 (Table 3.2-1).

Table 3.2-1 Production of shrimp aquaculture in Vietnam

Year	Production		Area	
	1000 tonnes	Index (%)	1000 hectares	Index (%)
1990	32.7	21.7	na	na
1991	35.8	9.5	na	na
1992	37.4	4.5	na	na
1993	39.4	5.3	na	na
1994	44.7	13.5	na	na
1995	55.3	23.7	na	na
1996	49.7	-10.1	na	na
1997	49.3	-0.8	na	na
1998	54.9	11.4	na	na
1999	57.5	4.7	na	na
2000	93.5	62.6	340.5	na
2001	154.9	65.7	476.7	40.0
2002	186.2	20.2	516.2	8.3
2003	237.9	27.8	580.4	12.4
2004	281.8	18.5	604.4	4.1
2005	327.2	16.1	533.2	-11.8
2006	354.5	8.3	616.7	15.7
2007	384.5	8.5	638.8	3.6
2008	388.4	1.0	636.1	-0.4
2009	419.4	8.0	629.9	-1.0
2010	450.3	7.4	652.0	3.5

Source: GSO, (2011)

The annual index during the period 2000-2003 showed the rapid increase in shrimp production in Vietnam with the maximum reaching 65.7% in 2001. Since 2006, the growth of shrimp production had slowly increased compared to previous years due to a drop in world market price and the occurrence of a serious disease in *P. monodon*.

The occurrence of the economic crisis made demand for shrimp to drop and world shrimp price in to decline. Many shrimp farmers suffered and gave up their cultivation due to discouraging business performance in the last years. Consequently, shrimp production could not develop as fast as it did before.

Data showed that shrimp disease occurred in the Mekong River Delta in the late 2000s which made many shrimp farmers in Vietnam fall into debt due to failure in production. The stocks of shrimp were totally destroyed after one or two months of cultivation due to the diseases.

Table 3.2-2 Area of water surface for shrimp aquaculture

Year	Total 1000ha	Area of sea and brackish water		Area of fresh water 1000 ha	
		1000 ha	%	1000 ha	%
2000	340.5	324.1	95.2	16.4	4.8
2001	476.7	454.9	95.4	21.8	4.6
2002	516.2	509.6	98.7	6.6	1.3
2003	580.4	574.9	99.1	5.5	0.9
2004	604.4	598	98.9	6.4	1.1
2005	533.2	528.3	99.1	4.9	0.9
2006	616.7	612.1	99.3	4.6	0.7
2007	638.8	633.4	99.2	5.4	0.8
2008	636.1	629.2	98.9	6.9	1.1
2009	629.9	623.3	99.0	6.6	1.0
2010	652.0	645.0	98.9	7.0	1.1

Source: GSO, (2011)

Geographically, the largest production of shrimp is in the Mekong River Delta with more than 70% of total production of the country. Table 3.2-3 proves the important role of the Mekong Delta in the contribution of the shrimp production to the country's economy contributing a maximum share about 81% (265,800 tonnes) in 2005 and 75.8% (341,100 tonnes) in 2010.

Apart from MRD, the Red River Delta, Northern Midlands and Mountain areas and South East areas are the three other regions for shrimp aquaculture in Vietnam. These regions account for about 20% of total shrimp production. Most areas in the regions practice improved extensive shrimp culture with an average yield of 116 kg/ha and the highest yields of 150 kg/ha.

Shrimp culture in the Southern Central coast also developed very fast. However the available area for shrimp pond is limited and volume is only about 5% of the total of the country. Most of the shrimp ponds in this region practice the semi-intensive type with average yield

amounting to 729 kg/ha. Phu Yen, Khanh Hoa, Ninh Thuan are the major provinces cultivating shrimp in the region. Due to topography, Phu Yen, Khanh Hoa and Ninh Thuan are also well known for hatchery stations that supply post larvae to other regions in the country.

Table 3.2-3 Shrimp aquaculture production by regions

(1000 tonnes)

	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
RRD	4.5	6.0	9.0	11.6	13.0	13.3	14.1	16.1	14.5	15.0	16.4
NMMA	0.1	0.1	0.1	0.1	0.1	0.3	0.4	0.4	0.3	0.4	0.4
NC&CCA	18.2	25.6	27.5	33.5	33.2	33.3	37.2	43.6	51.2	69.6	71.3
CEHI	0.0	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
SOEAS	1.8	4.8	6.7	10.4	12.8	14.4	15.9	14.9	15.2	15.8	21.0
MRD	69.0	118.4	142.9	182.2	222.6	265.8	286.8	309.5	307.1	318.6	341.1
Total	93.5	154.9	186.2	237.9	281.8	327.2	354.5	384.5	388.4	419.4	450.3

Source: GSO, (2011). RRD: Red River Delta, NMMA: Northern midlands and mountain areas, NC&CCA: North Central area and Central coastal area, CEHI: Central Highlands, SOEAS: South East area.

Zooming on the Mekong Delta, the main shrimp culture area of Vietnam, Ben Tre, Soc Trang, Bac Lieu and Cau Mau are the major area for shrimp culture which occupy about 70-80% of total cultivated area (Table 3.2-4).

There are four types of shrimp cultures existing in the MRD namely extensive, improved extensive, semi-intensive and intensive. Cau Mau the largest shrimp area in the MRD applied mostly the extensive culture type while Ben Tre, Soc Trang and Bac Lieu focus on intensive and the semi-intensive types.

The average shrimp yield is 4-7 tonnes/ha for the intensive and semi-intensive shrimp cultures. Shrimp production of Ben Tre, Soc Trang, Bac Lieu and Ca Mau accounts for more than 80% in the period 2000-2005 where shrimp production in Ca Mau, Bac Lieu and Soc Trang continuously increased in the period 2006-2009. The production of Ca Mau reached the highest one in 2010 (103,900 tonnes). Production of shrimp in Bac Lieu ranked in the second with about 68,000 tonnes (Table 3.2-5).

Due to the suitable climate the temperatures typically ranging from 20 – 35⁰C, shrimp culture was 2-3 crops/year in Ca Mau, Bac Lieu, Soc Trang and Ben Tre in the early 2000s. Later, when the outbreak of shrimp diseases caused a huge loss on farmers in the region, farmers were advised to raise shrimps for a maximum of two crops per year. Particularly, most shrimp cultures in Ben Tre have been cultivated one crop per year.

Density of shrimp culture depends on shrimp species. The species of black tiger *P. monodon* grew much lower than white leg shrimp *P. vannamei*.

Table 3.2-4 Water surface for aquaculture by province in the MRD

Year	MRD	Ben Tre		Soc Trang		Bac Lieu		Ca Mau		Σ %
	1000ha	1000ha	%	1000ha	%	1000ha	%	1000ha	%	
2000	445.3	29.3	6.6	41.4	9.3	54.0	12.1	204.4	45.9	73.9
2001	546.8	25.6	4.7	53.2	9.7	83.0	15.2	254.2	46.5	76.1
2002	570.4	36.0	6.3	48.3	8.5	100.6	17.6	271.4	47.6	80.0
2003	621.3	37.7	6.1	57.1	9.2	112.3	18.1	277.7	44.7	78.0
2004	658.5	41.1	6.2	59.0	9.0	118.8	18.0	277.7	42.2	75.4
2005	680.2	42.3	6.2	64.9	9.5	118.7	17.5	279.2	41.0	74.3
2006	691.2	41.0	5.9	64.3	9.3	120.2	17.4	275.2	39.8	72.4
2007	723.8	41.9	5.8	62.0	8.6	122.2	16.9	290.8	40.2	71.4
2008	752.2	42.1	5.6	67.7	9.0	125.6	16.7	293.2	39.0	70.3
2009	738.8	42.0	5.7	69.2	9.4	126.3	17.1	294.7	39.9	72.0
2010	753.3	42.5	5.6	71.5	9.5	131.7	17.5	299.1	39.7	72.3

Source: GSO, (2011)

Table 3.2-5 Shrimp aquaculture production by province in the MRD

Year	MRD	Ben Tre		Soc Trang		Bac Lieu		Ca Mau		Σ %
		1000 tonnes	%	1000 tonnes	%	1000 tonnes	%	1000 tonnes	%	
1999	41.4	5.2	12.5	3.2	7.8	5.9	14.3	19.7	47.6	82.2
2000	69.0	5.8	8.4	11.1	16.2	10.4	15.1	35.4	51.3	90.9
2001	118.4	8.0	6.8	13.7	11.6	28.3	23.9	55.3	46.7	89.0
2002	142.9	11.5	8.0	16.0	11.2	37.4	26.2	60.6	42.4	87.8
2003	182.2	13.7	7.5	21.2	11.6	55.3	30.3	62.4	34.3	83.8
2004	222.6	19.4	8.7	27.4	12.3	68.3	30.7	67.9	30.5	82.2
2005	265.8	25.1	9.4	42.8	16.1	63.6	23.9	81.1	30.5	80.0
2006	286.8	23.4	8.2	52.7	18.4	58.4	20.4	88.4	30.8	77.7
2007	309.5	25.4	8.2	58.5	18.9	64.2	20.7	89.7	29.0	76.8
2008	307.1	22.8	7.4	58.8	19.1	64.0	20.8	94.3	30.7	78.1
2009	318.6	20.3	6.4	60.5	19.0	68.2	21.4	99.6	31.3	78.1
2010	341.1	30.5	8.9	60.8	17.8	68.0	19.9	103.9	30.5	77.2

Source: GSO, (2011)

In terms of technical production, the detail of shrimp culture system in Vietnam was described intensively in 2007 based on the level of the inputs and production as follows:

- Extensive black tiger shrimp production, 70-150 kg/hectare/year, no inputs are supplied and there is only tidal water exchange;
- Improved extensive tiger shrimp production, 200-300 kg/hectare/crop;
- Semi intensive, 0.5 tonnes/hectare/crop;
- Intensive black tiger shrimp production at 3-6 tonnes/hectare/crop,
- Intensive white leg shrimp production at 15-20 tonnes/hectare/crop.

Shrimp extensive culture

The average area for shrimp extensive culture is about 5-7 hectares/farm. Shrimp cultivation depends completely on natural food propagation in the pond and on tidal water replenishment such as slow-moving microscopic animals, algae and crabs. Generally, wild post larvae enter the ponds during tidal flushing and live there until harvesting. Farmers do not need much financial capital to invest in except in land and pond preparation. The system normally cultivates one crop per year. The stocking density is about 1-2 post larvae/m² and the average yields range between 70-150 kg/ha/year. Shrimp are harvested twice a month, at the beginning and during the mid lunar-month.

Improved extensive culture

This system is similar to the extensive system in terms of pond preparation and pond area. However it is improved by adding shrimp seeds and feedstuff during production time. The density is about 1-2 seeds/m². Post larvae are raised at the time farmers think that stock density is low in the pond. Shrimps are fed with feedstuff. The average yield of this culture type is 200-300 kg/ha/crop.

Semi-intensive culture

Average area of semi-intensive system is usually 0.5-2 ha/pond. Ponds are built with two gates for water supply and release after harvest. However, most of farmers build their pond with only one gate for both purposes. Stock density of the system is about 5-6 seeds/m² with the average yield being about 500 kg/ha/crop (Vu and Griffiths, 2010). Shrimp are fed with feedstuff. Farmers culture one or two crops per year.

Intensive culture

Intensive shrimp culture, called as industrial system by local people, is one popular system. It requires high investment for pond and equipment as well as high operating cost. The density of this system is about 7-30 post larvae/m². The pond area is about 0.5-2 hectares. Shrimp are fed with feedstuff and cared with chemical and nutrients. Farm operation and management need to be run by skilled people. Shrimps are raised one to two crops per year with the yield recorded at about 3-6 tonnes/ha.

Shrimp culture is dominated by the black tiger in Vietnam. However due to its lower production, Vietnamese farmers have shifted to the white leg shrimp in recent years.

The white leg shrimp (*P. vannamei*) was first introduced in Vietnam in the late 1990s. The production of white leg shrimp had increased rapidly in the central and northern provinces of the country. Farmers prefer to raise this species due to 1) ease of breeding and domestication, 2) ease of high density culture, 3) lower protein feed requirement than black tiger shrimp, 4) tolerance to low water temperatures and 5) tolerance to poorer water quality than black tiger

shrimp (Vu and Griffiths, 2010). Nevertheless, due to its high risk in acquiring diseases, the development of the white leg shrimp has been controlled in the MRD until 2007 when the government allowed raising it again if conducted in intensive pond systems in safe aquaculture zone areas approved by provincial authorities (Vu and Griffiths, 2010).

Vietnam strongly depends on post larvae supplier by hatcheries which are mostly located in Central Coastal provinces such as Khanh Hoa and Ninh Thuan.

3.2.3 Contribution of shrimp culture to the national economy

Shrimp culture has played an important role in the economy of Vietnam. It ranks third among the key economic sectors of the country's agriculture after rice and pangasius. The total export volume of shrimp reached 240,985 tonnes with the value of USD 2.1 billion in 2010. Compared to 2005, the export volume in 2010 increase by 51% and export value increased by 53.6%. In 2011, the export value reached USD 2.4 billion (Figure 3.2-1).

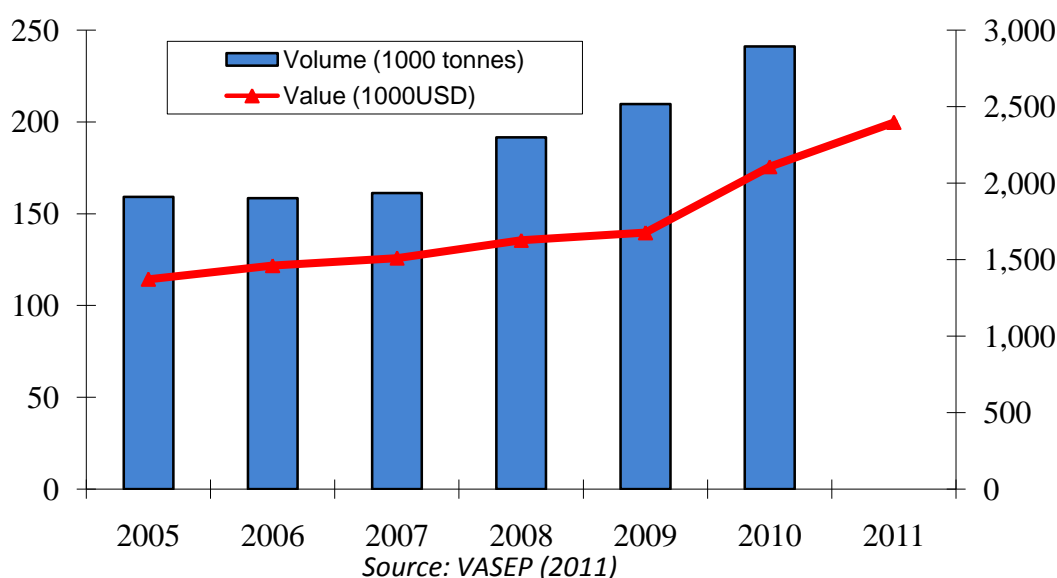


Figure 3.2-1 Vietnam shrimp export volume and value

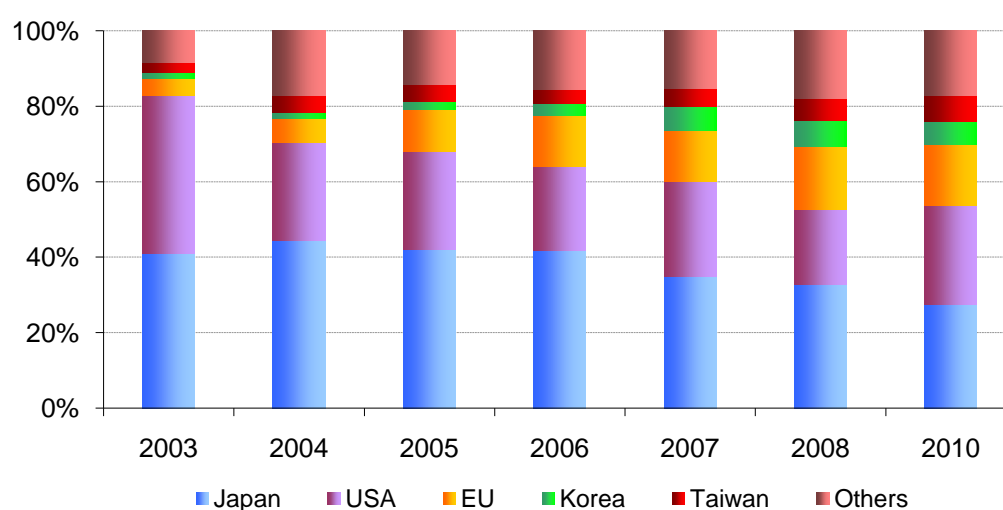
In 2006, the export volume to the US market decreased slightly due to a higher import price when the US applied an antidumping duty to shrimp imported from Vietnam. This in total export volume of the country decreased by -0.47% compared to 2005. Nevertheless, the total volume continuously increased again in the following years with 161,267 tonnes in 2007, 191,553 tonnes in 2008 and 209,567 tonnes in 2009, respectively. This achievement contribute USD 1.5 billion in 2007; USD 1.6 billion in 2008 and USD 1.68 billion in 2009 to the economy of the country.

Currently, the shrimp sector is developing as a high value agro-industrial economic activity which contributes greatly to the stability and development of Vietnam. Moreover, there are more than 1,400,000 people working in aquaculture with the share of labour force in shrimp projected to grow from 10% to 30% of the total aquaculture labour force.

3.2.4 Shrimp trade of Vietnam

As mentioned above, Vietnam exported 240,985 tonnes of shrimps, valued USD 2.1 in 2010 and USD 2.4 billion in 2011. This achievement contributed 40% of total fishery export, one of the most important agricultural sectors of the country. The domination of black tiger shrimp (*P. monodon*) occupied 80% of total shrimp export, with USD 1,65 billion in value and 178,585 tonnes in volume in 2010 (VASEP, 2011).

Shrimps are exported to 91 nations in the world in 2011. Japan, the US, EU, Canada, South Korea and China are the major markets for shrimp exported from Vietnam during the period 2003-2010 which account for about 66% of the total shrimp export value of the country (Figure 3.2-2).



Source: CAFEF (2009), VASEP (2011)

Figure 3.2-2 Destinations of Vietnam export shrimp

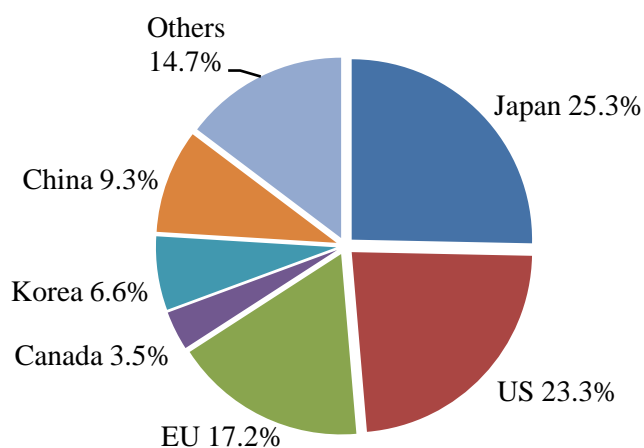
Currently, there are more than 300 processing plants in Vietnam related to shrimp trade, in which 60 bigger ones constitute more than 80% of export value. In 2010, about 100 processors reached an export value of 2 million USD while the total value of the rest accounted for about USD 78.46 million and 15,212 tonnes of exports (VASEP, 2011).

Minh Phu, Quoc Viet, UTXI, STAPIMEX, CAMIMEX, FIMEX, Phuong Nam, Vietnam fish-one, SEA Minh Hai are the top ten shrimp export companies in Vietnam.

In 2003, with the effect of the anti-dumping duty applied on Vietnam exported shrimp and the mechanism of custom-bond was applied in 2005, shrimp exported to the United States decreased. However, the shrimp businesses of Vietnam shifted their market to Japan and the European Union. The market share of shrimp exported to Japan increased in the period 2004-2006. There was also an increase in the European market during the same period.

Besides, shrimp processing businesses in Vietnam looked for new markets, such as China, Switzerland, Australia and Canada.

The share of Vietnam shrimp export to the world in 2011 is presented in Figure 3.2-3.



Source: VASEP (2012)

Figure 3.2-3 Share of Vietnam shrimp export to the world in 2011

Japan is the largest market for shrimps exported by Vietnam with about 25.3%. The US came in second concerning 23.3% of total Vietnamese shrimp export volume to the world. This is followed by the EU with about 17.2%, and China with 9.3%.

Focusing on the Japanese market where Vietnam is the biggest supplier in 2011, about 20.43% of shrimp sold in the market have Vietnamese origin (Figure 3.2-4). The value of exported shrimp to this country was about USD 607 million in 2011. The major competitors of Vietnam shrimp in this market are Indonesia, Thailand and India where the market shares are also large with 17.38% for Indonesia, 15.79% for Thailand and 12.79% for India. Furthermore, these countries have similar natural, environmental conditions and agricultural practices with Vietnam.

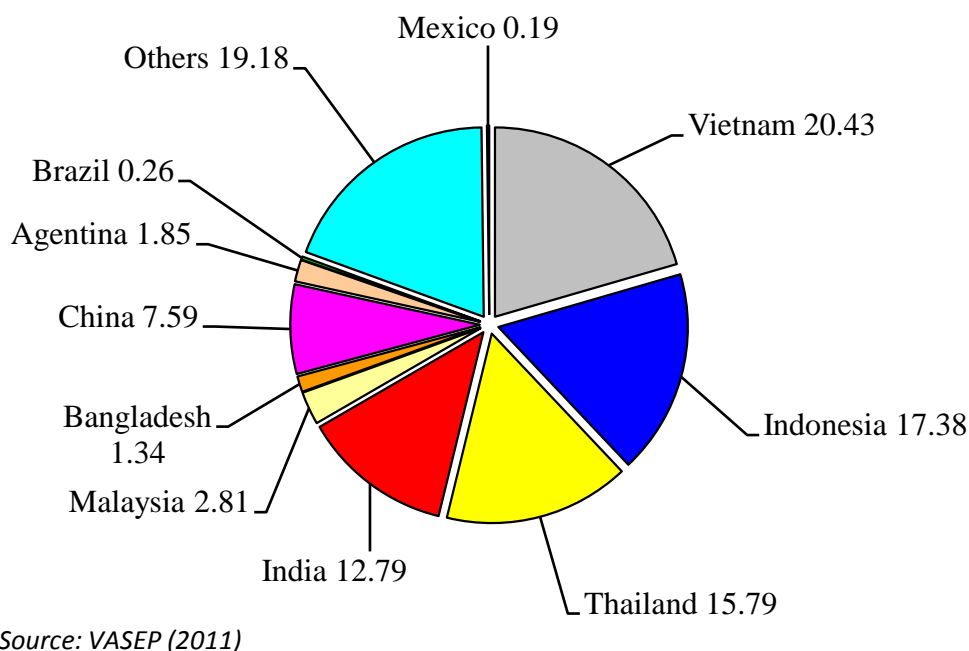
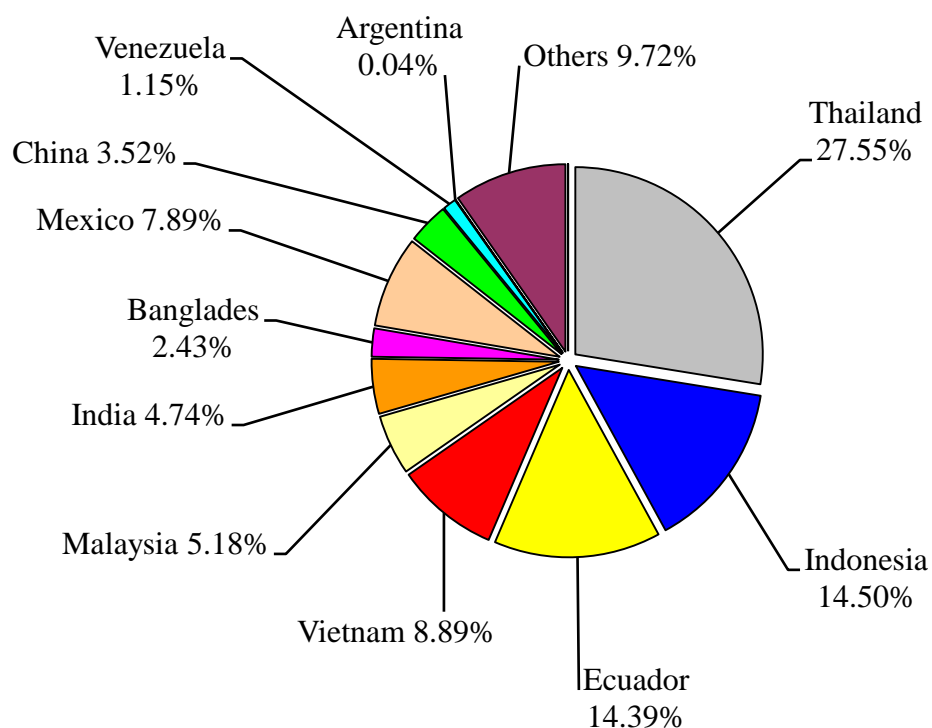


Figure 3.2-4 Market share of Vietnam shrimp in Japan in 2010

In the US, Vietnam ranked fourth as the biggest shrimp exporters after Thailand, Indonesia and Ecuador. The market share of Vietnam shrimp was about 8.89% in 2010 (Figure 3.2-5). In 2011, shrimp exported to the US contributed USD 558 million to the economy of the country. Compared with 2010, the export volume increased by about 1.3%. The slight increase in demand is indicated by an increase in the shrimp price in this market which brought higher value for Vietnam shrimp.

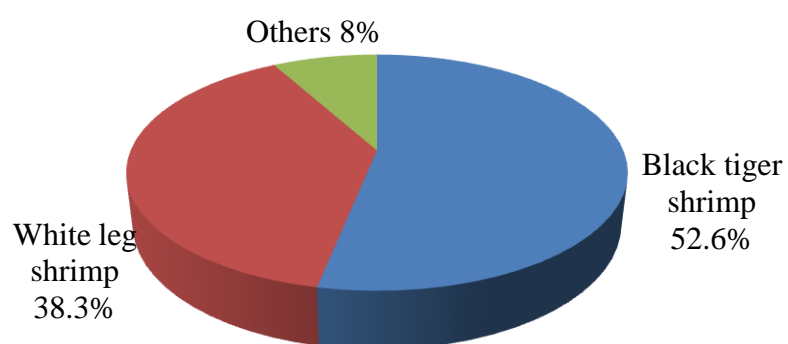
The US imported both material and processing shrimps from Vietnam with a preference for big sized shrimps having 15-40 count/kg in 2011. There is about 8% shrimp size less than 15 count/kg exported to the US in 2011, 9% with the size 16-20 count/kg, 13% with the size 26-30 count/kg, 14% with the size 21-25 count/kg and 21% with the size 31-40 count/kg. The small size, which is > 50 count/kg, is also exported to the US; however the share is lower than the big one (VASEP, 2012).

The United States primarily imports two types of shrimp, the black tiger and the white and brown shrimp in the forms of shell-on, peeled and cooked. Major of these imports came from Thailand, Vietnam, India, Indonesia, Bangladesh, China, Ecuador, Honduras, Brazil, and Venezuela. With 52.6% of black tiger shrimp exported, Vietnam is strong competitor of Thailand, India, Indonesia and Bangladesh in the US. China, Ecuador, Honduras, Brazil, Venezuela are the main competitors of Vietnam in the US for the white leg shrimp where about 38.3% was exported to the US in 2011 (Figure 3.2-6).



Source: VASEP (2011)

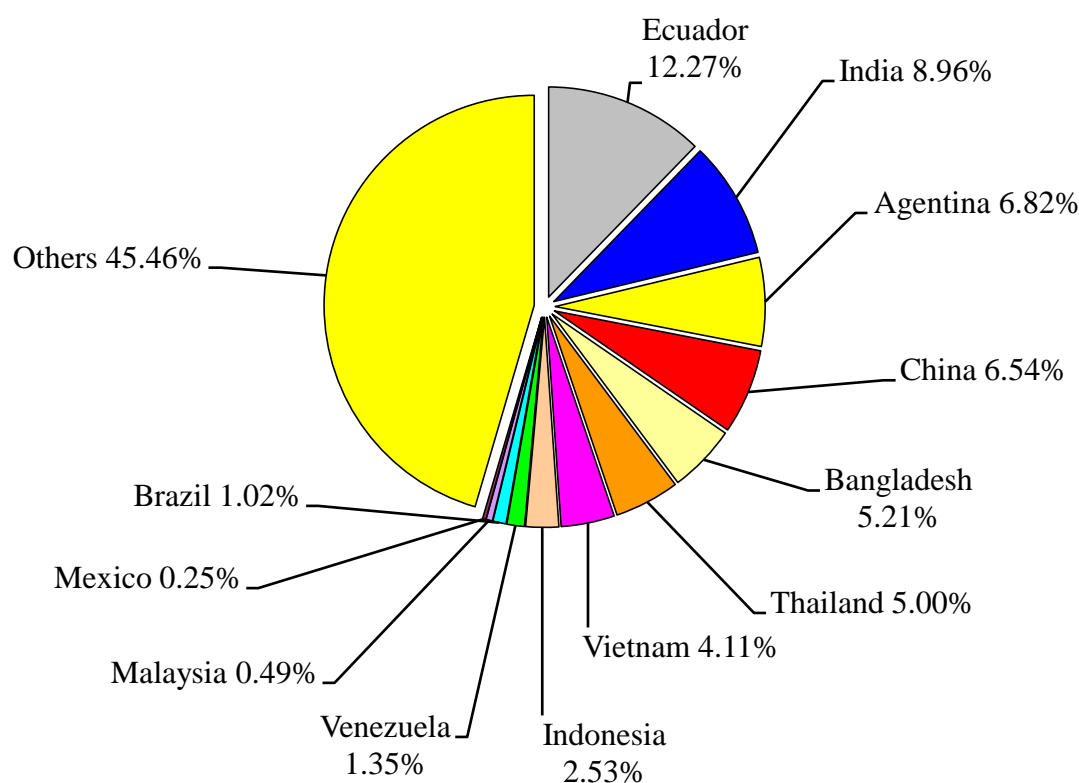
Figure 3.2-5 Market share of Vietnam shrimp in the US in 2010



Source: VASEP (2012)

Figure 3.2-6 Share of shrimp export by species in 2011

In the EU, Vietnam ranked seventh after Ecuador, India, Argentina, China, Bangladesh and Thailand. The market share of Vietnam shrimp in this region is about 4.11% (Figure 3.2-7). The value registered this market was about USD 412.9 million in 2011.



Source: VASEP (2011)

Figure 3.2-7 Market share of Vietnam shrimp in the EU in 2010

Germany, England and Belgium are the three biggest customers of Vietnam shrimp in the EU with value share of about 27.4% (USD 113.1 million), 17.7% (USD 73.0 million) and 12.6% (USD 52.1 million) respectively.

Figure 3.2-8 shows the prices of Vietnam shrimp in its three main markets namely the US, EU and Japan since June 2007 to June 2011.

Shrimps sold in the US market have a higher price compared to EU and Japan due to the preference of importers of the big sized shrimp. The average price of shrimp in this market in June 2007 was USD 14.04 per kilo. This figure slightly decreased by the end of 2007 and 2008 due to the impact of the economic crisis to the world, especially in December 2009 when the price was down to USD 8.72 per kilo. Since the beginning of 2010, the price of shrimp has been slowly increasing again due to the positive recovery of the world economy after the crisis.

Similar to the US market, the price of shrimps in the EU and Japan declined during the period of economic crisis and increased again when the impact has lessened. The average prices of shrimp in the EU and Japan in June 2007 were USD 8.24 per kilo and USD 8.40 per kilo, respectively. The lowest price was in December 2009 at USD 6.7 per kilo in the US and USD 8.42 per kilo in Japan. For the period 2010 to Jun 2011, the price increased to USD 8.7 per kilo in the US and USD 9.43 per kilo in Japan.

In brief, though the price of Vietnam shrimp has been increasing recently, there is a trend of decreasing shrimp prices in the world market.

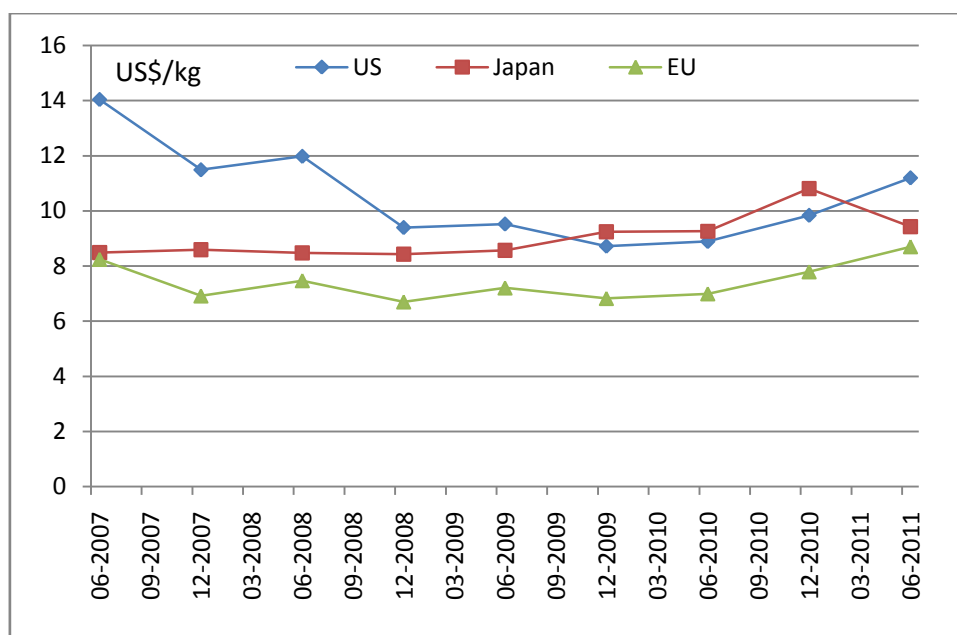


Figure 3.2-8 Price of shrimp export to the EU, the US and Japan

3.2.5 Main problems of shrimp production in Vietnam

In recent years, the position of Vietnamese shrimp has been strengthened in the global market, especially in 2011 when Viet Nam's shrimp exports reached about USD 2.4 billion. The achievement marks a significant success for the shrimp industry. However, Viet Nam's shrimp sector have also encountered severe difficulty both in technical and social aspects such as production cost, production quality (food safety and hygiene), shrimp disease, international market prices, international trade and non trade barriers, environmental management, and life devastation. Shrimp disease, environmental pollution, and livelihood devastation are the extremely serious problems identified.

Shrimp disease

Shrimp diseases had broke out in Vietnam after a number of years of shrimp culture operations. They experienced the same disease outbreaks as observed in other South East Asian countries.

In 2011, there were 85,500 hectares of shrimp aquaculture area affected by shrimp disease. In where 81,000 hectares were cultivated with the black tiger shrimp and more than 3,600 hectares with the white leg shrimp. Shrimps died at the beginning of the crop season (VASEP, 2012).

Viral disease is the main type of shrimp disease in Vietnam such as the white spot disease and the yellow head disease. Presently, an unidentified shrimp disease has become serious, especially in the MRD and the Central Coastal provinces. It is estimated that more than 30,000 households have been suffering losses as a result.

In the MRD, over 11,000 hectares of shrimp farms in Bac Lieu were destroyed. About 6,200 hectares of shrimp farms were affected in Tra Vinh where 330 million shrimps have died. In Soc Trang, 20,000 out of the 25,000 hectares of shrimp farms were destroyed, causing USD75 million in losses (Aquaticealth, 2012).

The main reasons for this problem are low quality shrimp seeds, environmental factors and poor farm management (Nguyen, 1999).

In term of the environment, drought spells, high amplitude of day and night temperature, very high water temperature in shallow ponds at noon time, long inundation caused by rainfall and floods and, unclean water supply source and full of sediments making the shrimp cultivation environment unsafe.

The combination of 1) the preparation and treatment of the pond bottoms before stocking and after harvesting are not carried out with appropriate technology; 2) the mud on the bottom is not taken out, dried or limed; 3) the irrigation systems are usually not appropriate when only one canal is used for supplying and discharging wastewater, and 4) feed and feeding methods in shrimp farms are not appropriate, are the main factors in term of farm management.

For the shrimp seeds, because of the high demand from farmers, many very young shrimp seeds, which are too weak for release into the pond, were delivered. As a result, they are very easily attacked by diseases.

Environment pollution

The rapid development of shrimp aquaculture in general, and the conversion of rice and mangrove forest to shrimp culture in the coastal area in the MRD in particular have created a very serious impact on the environment of Vietnam.

Over a decade, since the government promoted shrimp aquaculture and allowed converting land for rice to shrimp culture, Vietnam has lost a large area of mangrove forest and rice land. Tran (2003) stated that about 100,000 hectares of mangrove forest were destroyed for shrimp culture in the Ca Mau Peninsula. Consequently, the destruction left coastal areas exposed to erosion and flooding, altered natural drainage patterns, increased salt intrusion and removed critical habitats for many aquatic species, with serious implications for both biodiversity conservation and food security (Environmental Justice Foundation, 2003).

Rice areas have also been strongly affected by the movement of the shrimp sector in the MRD. Tran (2003) indicated four main problems on the environment caused by the conversion from rice to shrimp culture as follows:

- Water resources will be worse when fresh water ecosystem in ex-rice culture and salinisation of the surface is destroyed. The groundwater will be saline due to the seeping of brackish water in the pond.
- Water environment is hared due to disease contamination. The environment is polluted due to nutrient loading, chemical and antibiotic use.
- Aquatic biodiversity declines.
- Land is abandoned due to the degradation of land and water resources in coastal areas.

It is observed that, shrimp culture under semi-intensive and intensive types utilize a lot of feeds, pesticides and antibiotics. Water exchange is necessary in these types of cultivation which means that residues of chemical inputs (antibiotics, fertilizers, pesticides, and hormones) are released directly to the natural environment. Consequently, pollution has risen in the region.

Livelihood devastation

Shrimp culture has been promoted by the Vietnamese government as a method for improving household livelihood in rural areas. High profits on shrimp cultures in the beginning have attracted many farmers to join in the game.

However, later on, the activity has been characterised by extraordinarily high levels of risk, exposed poor farmers to financial difficulty and increased the socio-economic disparity.

Shrimp culture, especially semi-intensive and intensive types requires high financial capital for investment, preparation and inputs. As a conversion from rice, which was low investment, to shrimp cultures, many farmers needed to borrow money from banks or informal credit sources to construct their ponds and buy inputs. If farmers succeeded with their culture they would pay back the loan and save the rest for the family. However, shrimp culture is a very risky activity that farmers tend to easily fail due to climate, shrimp disease and even farmers' lack of skills.

Environmental Justice Foundation (2003) argued that defaulting on loan repayments is a common outcome when harvests fail or yields begin to decline. Many farmers will try to continue their activity as a gamble with a hope that they might succeed in the next season. Money at this time cannot be borrowed any more from the bank so that they need to look for other sources at high interest rate. If farmers fail, they will be unable to pay their loans and will fall further into debt. Consequently they will have to sell their lands in order to cover the debt and resulting to increased landlessness in the MRD (Figure 3.2-9).

In brief, on one hand, shrimp culture is like a double-edged sword, it could create an opportunity to become well-off but at the same time it could lead a path to extreme poverty for farmers if the venture proved to be unsuccessful.

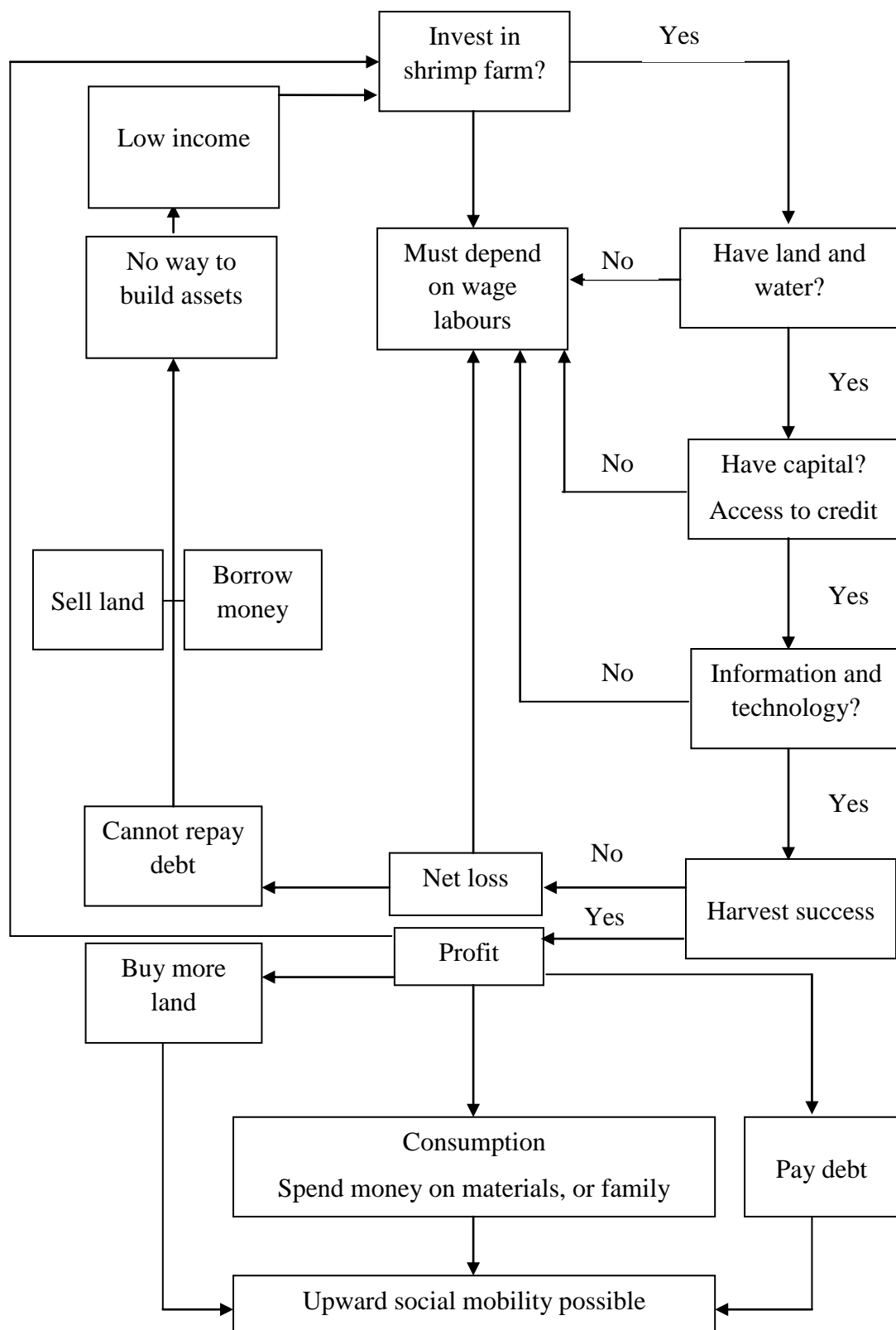


Figure 3.2-9 The road to riches or the path to poverty? (Oxfarm GB)

3.3 DESCRIPTION OF THE RESEARCH SITE

The research was conducted in three provinces Ben Tre, Soc Trang and Bac Lieu in the MRD based on the similar in shrimp production conditions, cultivation areas, representation for agro-ecological systems and type of value chain in the region.

Each province showed the different model of shrimp value chain in the region. Ben Tre province showcases the vertical integration under contract farming form between small scale production farmers and a processing plant. Soc Trang represents the model of vertical integration under contract farming form between large scale production farmer and a processing plant. Therefore, the description of the research site of these provinces has focused the provincial level.

Bac Lieu province represents shrimp small scale producers who were not engaged in contract farming and has linkage with other actors in the shrimp value chain. Based on the first research results of the project entitled “Improvement of shrimp product quality exported to Europe through building up capacity of shrimp producers, private sector and local authority in Bac Lieu province” funded by the EU Commission to Vietnam in 2005, this study chose Vinh My village in Hoa Binh district to showed the evolution of shrimp production at the farm level. Moreover, data showed that there were similarities in shrimp production at the farm level among the provinces in the region in terms of weather and technical skills. Therefore, the case of Vinh My village could represent the other provinces in the MRD.

3.3.1 Mekong River Delta

The Mekong River is one of the twelve longest rivers in the world which is located in Asia. It flows through and along the borders of six countries namely China, Myanmar, Laos, Thailand, Cambodia and Vietnam for about 4,160 km. Before river waters arrive in Vietnam, the river is divided into two tributaries in Cambodia. In Vietnam, the first tributary, called Tien, branches out into six channels while the second one, called Hau, branches out into three channels. Taken as a whole, these nine channels from the innage of a dragon, creating a delta in Vietnam, named Cuu Long-Nine Dragongs in Vietnamese.

The MRD is located in the southwestern part of Vietnam. It is one of the eight most economically advanced ecological regions of the country, namely Northern Mountain and Midland, Red River Delta, North Central Coast, South Central Coast, Central Highland, Northeast South, and Mekong Delta. The natural land of the Mekong River Delta is about 40,519 km² and occupies about 12.24% of the total natural land of the country; of which about 2550.7 hectare of land is devoted agricultural and aquaculture production (GSO, 2010). However, its size of the area covered by water depends on the season where is larger in dry season and smaller in rainy one.

MRD has a border with Cambodia in the west. It is faces the East Sea in the east and the south. The delta accommodates 13 provinces of Vietnam, namely, Long An, Tien Giang, Ben Tre, Vinh Long, Tra Vinh, Dong Thap, Can Tho, Hau Giang, An Giang, Kien Giang, Soc Trang, Bac Lieu and Ca Mau (Figure 3.3-1).

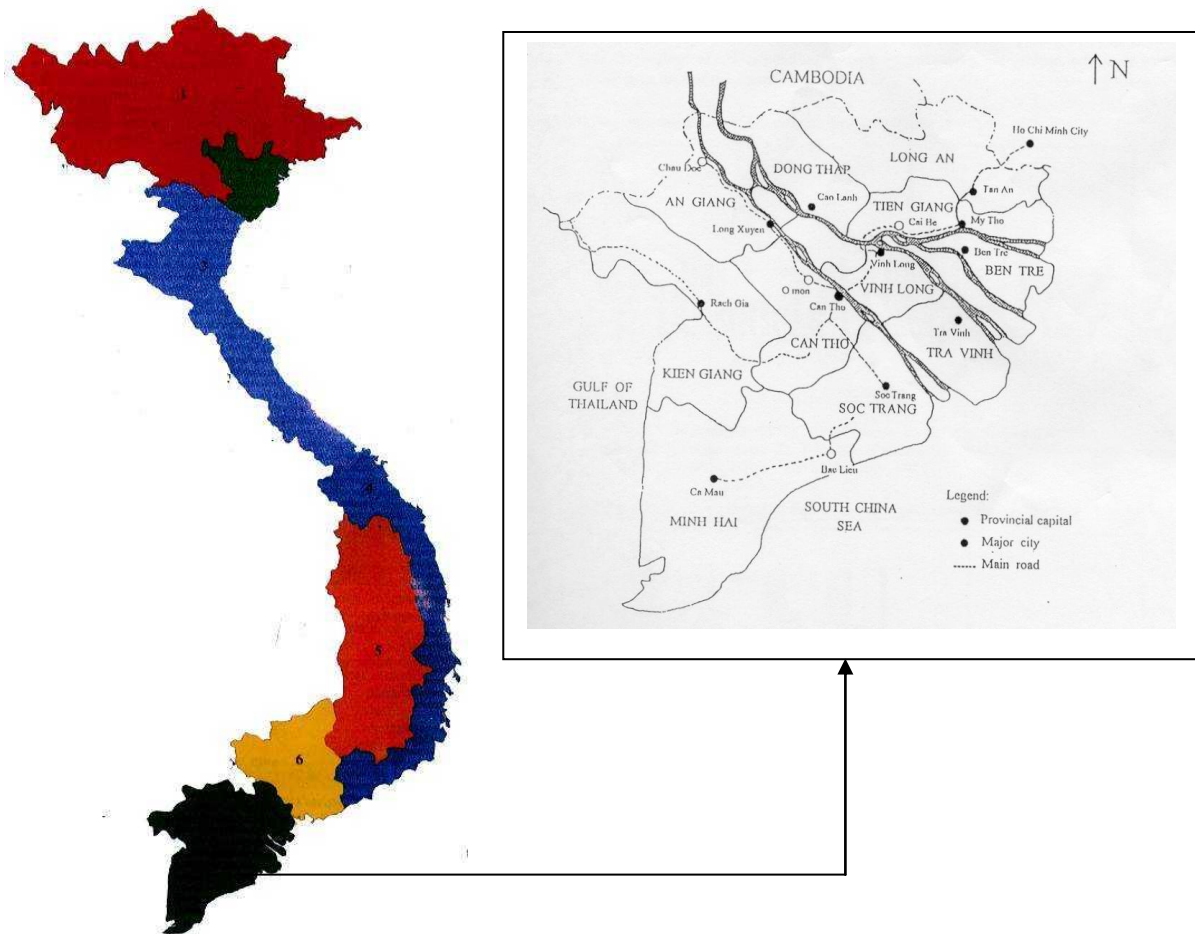


Figure 3.3-1 Map of the Mekong River Delta, Vietnam

The population of MRD is about 17.27 million people. The largest ethnic group in the region is Kinh. This is followed by Khmer, the minority population living primarily in Tra Vinh and Soc Trang provinces. The other small group is Cham living in An Giang province. The Chinese population accounts for a small part and lives in Kien Giang, Bac Lieu and Ca Mau provinces.

The Mekong River Delta population density is nearly double of Vietnam's average, with many of these people living in floating homes and villages only accessible via the river. These people's livelihood depends directly on the river, but their way of life has large ecological impact.

In recent years, the economy of the MRD has attained higher growth. During the period 1998-2010, the economic structure in the MRD has changed considerably due to the new policy of government that allowed farmers to convert less productive rice fields, uncultivated areas, and salt pans into ponds for aquaculture. This pushed the gross output value of agriculture of GDP to increase sharply. Meanwhile, the gross output value of the other sectors such as industry, construction, and service increased negligibly. Consequently, the growth rate of the MRD's economy depends strongly on agriculture, especially aquaculture which constitutes more than 52% of the whole economy (GSO, 2010).

With over 700 km of coastline and a dense network of rivers and canals, the MRD is the biggest potential area for the production of aqua-products in the country. The growth rate of fisheries output increased sharply in the period 1999-2010 which comprised about 50% of the total output of the country. The main aqua-products of the region are the black tiger shrimp, white leg shrimp, pangasius, tilapia, cuttles and crustaceans, of which shrimp and pangasius are the two main export products.

Regarding shrimp production, Ca Mau is the leading province in terms of output volume as well as export value in this region, followed by Bac Lieu, Soc Trang and Ben Tre provinces with a long coastline. The development of the shrimp production sector has been drastic in the period 1999-2005 with approximately 300,000 ha of rice fields in Ben Tre, Tra Vinh, Soc Trang, Bac Lieu and Ca Mau provinces converted into shrimp areas.

The details of shrimp production in the MRD will be discussed in the next sections.

3.3.2 Ben Tre province

Ben Tre, one of thirteen provinces in the MRD, is located near one of the mouth of the Mekong River and is surrounded by Tien Giang, Vinh Long, and Tra Vinh. The four main rivers are Tien Giang, Ba Lai, Ham Luong, and Co Chien.

Ben Tre lies in the lowest part of the Mekong River basin. It is some 85 km far south of Ho Chi Minh City, borders include Tien Giang to the North, Cuu Long to the west and the East Sea to the east (Figure 3.3-2).

The tropical climate of Ben Tre is influenced by monsoons. Ben Tre's rainy season is like the other province in the MRD region, lasting from May to October and the dry season from November to April. Due to the presence of many rivers, the average annual temperature is 26°C and the humidity level is quite high.

The population of the province is about 1.25 million people (GSO, 2010). Most of inhabitants of the province are Kinh.

The province has 2360 km² of natural land area, 65km of coastline which provides a high potential for aquaculture production, especially shrimp cultivation in brackish water.

Fishing and aquaculture in Ben Tre have expanded significantly since 1999 after the issuance of Decision 09/NQ-CP, issued on 15th June 2000 allowing farmers to convert rice land to aquaculture production.

Nowadays, shrimp production in Ben Tre province ranks fifth in the MRD region after Ca Mau, Bac Lieu, Soc Trang and Kien Giang provinces with 42.5 thousand hectare (GSO, 2010).

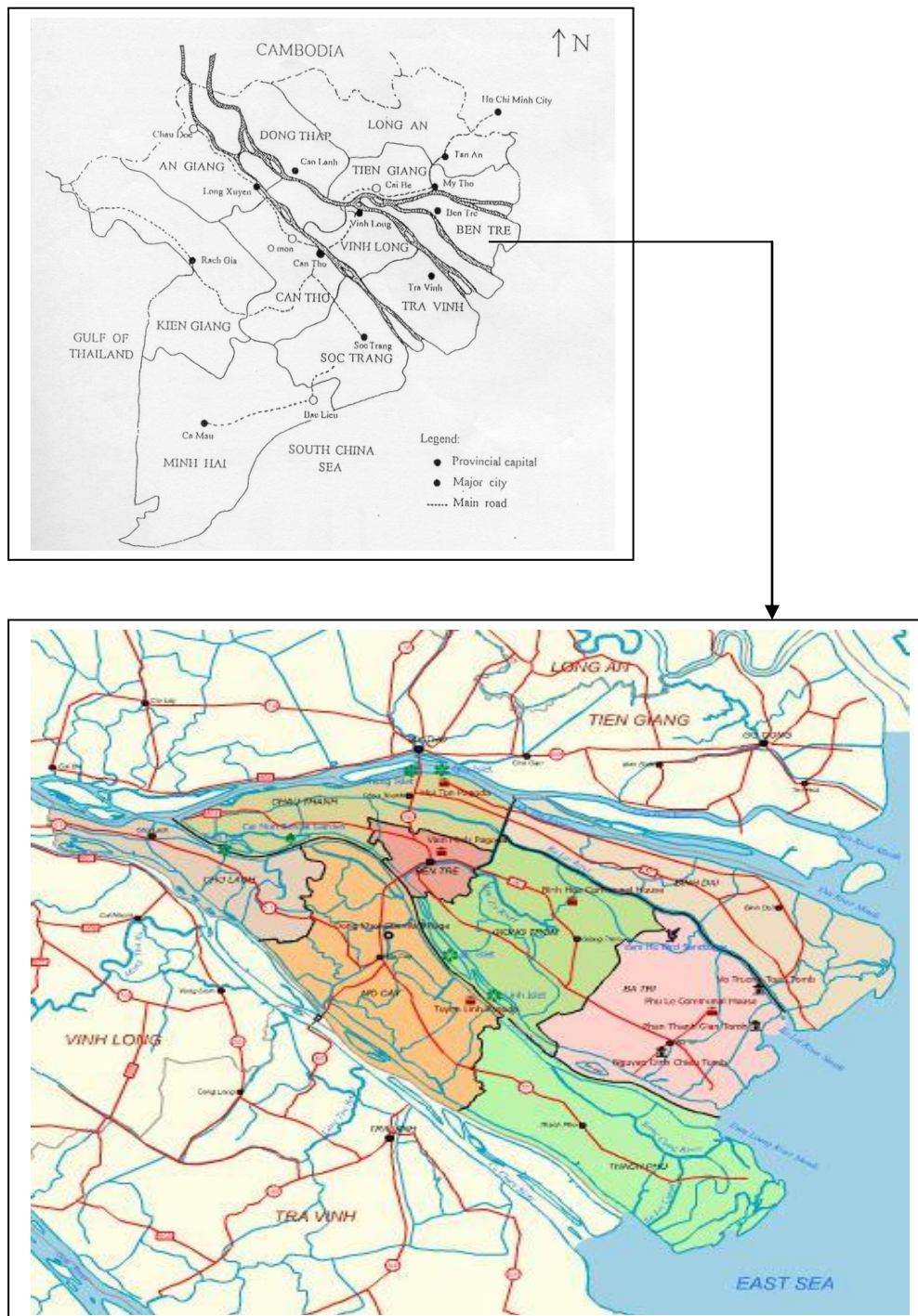


Figure 3.3-2 Location of Ben Tre province

3.3.3 Soc Trang province

Soc Trang province is located in one of the mouth of the Mekong River. It is 231 km far south of Ho Chi Minh City, 62 km from Can Tho. It has borders with Hau Giang in the north, Tra Vinh in the north east, Bac Lieu in the south, and East Sea in the east (Figure 3.3-3).

The province has 3311.8 km² of land which accounts for about 1% of the total land area of the whole country and 8.3% of the total land of MRD. It has 72 km of long coastal line with three estuaries to the East Sea namely Dinh Anh, Tran De and My Thanh.



Figure 3.3-3 Map of Soc Trang province

Like other provinces in the MRD region, Soc Trang has a tropical climate which is influenced by monsoons. The rainy season starts from May to October and the dry season from November to April. The average temperature of the province is about 26.8°C.

The population of Soc Trang is about 1.2 million people. This is a multi-ethnic province with many Kinh, Khme, Cham and Chinese inhabitants.

With 72 km of coastal line, the total area for aquaculture in Soc Trang is about 54,373 hectares, occupying 16.42% of the total land of the province.

Presently, Soc Trang ranks as the second largest province with land for aquaculture in the MRD after Ca Mau. There are about 50,000 household farming shrimp in Soc Trang covering 48,000 hectares of ponds.

3.3.4 Bac Lieu province

Bac Lieu, a coastal province, is situated in the Mekong River Delta. It is about 110 km from Can Tho and 280 km from Ho Chi Minh City. The province was once a part of Minh Hai province during the period 1976-1996. In 1996, Minh Hai province was divided into two parts, Bac Lieu in the northwest and Ca Mau in the southwest.

Nowadays, Bac Lieu has borders with Kien Giang and Hau Giang provinces in the north, Soc Trang province in the northeast, Ca Mau province in the southwest and faces the East Sea in the southeast (Figure 3.3-4).

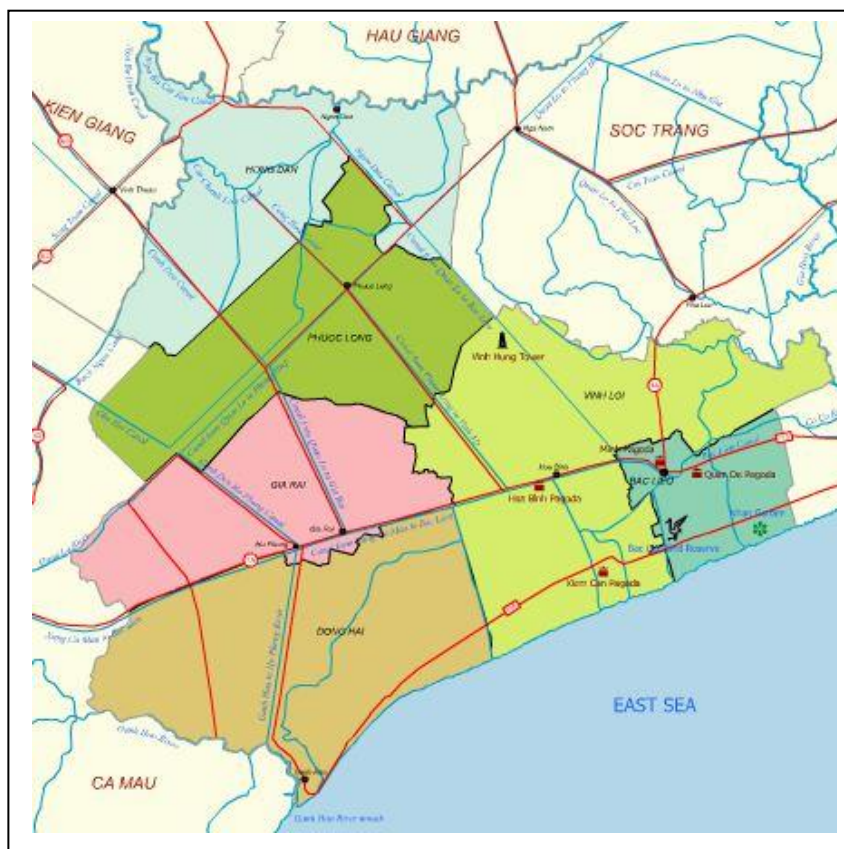


Figure 3.3-4 Map of Bac Lieu province

The total area of the province accounts for about 250.2 thousand hectares, of which about 40% is for agriculture and aquaculture production. There are 867.8 thousand habitants living in six districts of the province, including Dong Hai, Gia Rai, Hoa Binh, Hong Dan, Phuoc Long and Vinh Loi. The same as Soc Trang province, population in Bac Lieu includes four main ethnic groups such as Kinh, Khme, Chinese and Cham.

Bac Lieu has a climate characteristic of the sub-region. The rain during the rainy season accounts for 90% of the total annual rain fall, which is concentrated from May to October with a precipitation of 1727.6 mm. In July and August, there are some long dry periods causing a moderate drought in the region. The annual average temperature is 27°C. April has the highest hours of sunshine within the year (273.5 hrs). Annual average humidity is 83% and radiation level is 240 Kcal/cm². This value is usually varied throughout of the year with the lowest radiation level in December (5Kcal/cm²).

Vinh My, known as Vinh My A by 2008, is one of the villages in Bac Lieu province. It is a coastal village in Hoa Binh district located in the north-eastern part of Bac Lieu province (Figure 3.3-5).

As a village of Bac Lieu province, Vinh My has the same geography, weather, and climate that is suited for aquaculture development in general and shrimp production in particular.

The total population of Vinh My is about 16,700 people with about 3,104 families. The population is mostly Kinh, Khme and Chinese.

The total natural land area is 52 km². Most of the land area have been used for agriculture and aquaculture production.



Figure 3.3-5 Map of Bac Lieu province and Vinh My village

3.4 CONCLUSIONS

Shrimp is one of the most popular types of seafood in the world with approximately five million metric tons of shrimp produced annually. Most shrimp aquaculture are located in China, followed by Thailand, Indonesia, India, Vietnam, Brazil, Ecuador and Bangladesh. The majority of farmed shrimp is exported to the United States, European Union and Japan. Shrimp development in developing countries is result of a strong demand for products from shrimp catches or aquaculture, the artificial reproduction control over shrimp, and the level of interest of national and international development agencies.

For the trends, in order to make systems biologically secure in for a significantly lower risk of disease coming from both environmental threats and devastated mortalities in shrimps farmed, recirculation shrimp farming technology has been developed. Though many of the best sites for shrimp farms already have been used, there is still opportunity for the expansion of shrimp farming, especially in Brazil, several African nations.

Vietnam, one of the main shrimp producers in the world, started its shrimp production more than a hundred years ago. The sector developed robustly in 2000s after the government issued Resolution No. 09/2000/NQ-CP allowing farmers to convert rice lands to aquaculture production. Shrimp cultivation in Vietnam employs four types of model, namely, extensive, improved-extensive, semi-intensive, and intensive cultivation. Shrimp cultivation is mostly practiced in the MRD with the black tiger shrimp as the main seed. In recent years, the white leg shrimp has propagated strongly due to its high productivity.

Shrimp has continuously contributed huge export values to the Vietnam economy, created jobs for many Vietnamese, and improved the living standards of a large part of the population. However, the sector is also well known for having a very high risk on the environment; and is often associated with disease, pollution, land destruction, and social problems such as indebtedness, landlessness and poverty. These problems confirm that *shrimp culture is highly unsustainable* in Vietnam.

In order to increase the ability to developed markets such as the EU, Japan and US, the main strategies that the shrimp sectors in Vietnam have to adopt are as follows: 1) the creation of a legal and regulatory framework that is congruent with the legal standards of targeted markets; and 2) active participation and involvement of the private and public sector to upgrade and modernize the sector by investing in processing, facilities, machineries and marketing skills, which are competitiveness-drivers in global markets.

CHAPTER 4. RESEARCH METHODOLOGY

4.1 APPROACH

The research used the inductive approach. The discussion, therefore, was supported by observations, data collection, and analyses of the existing conditions in benchmark sites. The study focused on the farmers in the Mekong River Delta, specifically in the provinces of Ben Tre, Soc Trang, and Bac Lieu where more than 70% of the region's total volume of shrimps is produced.

The study utilized both qualitative and quantitative analyses. The qualitative method focused on the analysis of key drivers, trends, institutions, policy environment and the relationships among actors in the shrimp value chain as well as their behaviour which impact on the development chances of farmers in the shrimp value chain. The quantitative approach utilized the cost and return method to analyse the impact of different value chains on farmers' production. Moreover, participatory research – or the participation of target groups in the study process – was employed to ensure consistent cooperation between the researchers and beneficiaries of the research. Lastly, the value chain approach was also used to analyse the vertical integration of the actors in the shrimp value chain.

The details of the project's research methodology were discussed in the next sections.

4.2 ANALYTICAL FRAMEWORK AND METHODOLOGY

The study involved the following activities or procedures: describing and analysing the current shrimp value chains in view of the vertical integration of farmers; identifying the factors affecting their production behaviours; and analysing farmers' abilities to join the value chain and evaluating the impact of the decision to join.

Based on the hypotheses, the analytical framework of the study can be identified as follows:

1. Describing the current shrimp value chains and analysing inherent relations among actors in the shrimp value chains;
2. Describing and analysing exogenous factors (socioeconomic and policy environments, and the market trend) which affect the opportunities of farmers to join;
3. Evaluating the differences in the benefits derived by farmers in the different shrimp value chains; and
4. Drawing out plans and strategies for the development of the shrimp value chain, and the competitiveness of sector in term of efficiency and high quality products.

4.2.1 Describing the current shrimp value chains and analysing the inherent relations among actors in the different chains that affect farmers' abilities to develop their production

This action was divided into two steps:

Step 1. Draw out the shrimp value chains

The purposes why this step is being implemented are as follows:

- To have an appearance of networks and understand more clearly all the linkages among actors in the shrimp value chain and its process;
- To show the interdependence of actors and processes in the shrimp value chain;
- To provide operation scope of one actor to another involved in the shrimp value chain.

To achieve the above objectives, the following questions need to be answered:

- 1) What are the main process systems in the value chain?
- 2) Who participates into these processes?
- 3) Which product lines, information and knowledge exist in the shrimp value chain?
- 4) What are the upstream and downstream of one product?
- 5) What kind of linkages and relationships exist among actors in the shrimp value chain?
- 6) What kind of services supports the shrimp value chain?

These questions served as the basis in drawing out the systems in the shrimp value chain. To address these question, the phase was divided into the following steps through a survey:

- Draw out the kernel of the shrimp value chain with the question: How many different kernels of processes are in the shrimp value chain? Based on the principal, it needs to distinguish the main processes involved in the production of the primary to final products. The drawn out kernels may differ depending on the characters in the shrimp value chain.
- Determine and draw a diagram of all the actors involved in the shrimp value chain. Drawing out the kernels of the shrimp value chain helped determine the actors and their corresponding roles in the shrimp value chain. The survey has to focus on the size, number of actors and location.
All the processes and actors and their activities in the value chain were presented in a flow diagram. This helped identify the product lines involved in the value chain including all the materials included in the upstream and downstream industries.
The study determined the number of farmers, dealers, collectors, processing plants that were in the shrimp value chain.
- Draw out the relation and linkages among actors involved in the shrimp value chain.

Step 2. Analyse the inherent relation among actors in the value chain

An analysis of the inherent relation among actors in the shrimp value chain was conducted. This is not only to determine the linkages or non-linkages between organizations and actors but also to determine the reasons behind those relations, their advantages and disadvantages.

This part of the analysis focused on organizations, institutions, production management, food safety management, traceability, capacity building, and policy environment done in the area of production among actors in the shrimp value chain to adapt to market requirements.

The main questions and analysis aspects are as follows:

- 1) What kind of linkages exists in the shrimp value chain?
- 2) What is the importance of these linkages?
- 3) How many people are involved in the linkages?
- 4) How often do they interact or made contact?
- 5) What is official level of the linkages?
- 6) What are the reasons of why linkage and non-linkage models exist?
- 7) What are the levels of trust among them?
- 8) How long do these linkages exist?
- 9) How do formal relationships develop among the participants in the shrimp value chain?

The following courses of action helped answer the above questions:

- Determine the following aspects related to the linkages to be analysed:
 - o The existence of linkages;
 - o The number of people involved in the linkages;
 - o The frequency of communication;
 - o Formal level (official relation, unofficial agreement, written contract);
 - o Reasons of the linkages and the absence of linkages;
 - o Correlation of the benefits and costs of the linkages;
 - o Levels of trust among actors in the linkages (doubtful, no-trust, trust, high trust).
- Interview actors in the shrimp value chain to determine their role in the shrimp value chain.
- Analyse survey results.
- Determine the development chances of farmers in the shrimp value chain through the above results/observations.

Vertical and horizontal (intra and extra) relationships were determined to analyse the development chances of farmers in the shrimp value chain.

Description statistics and SWOT analysis (strengths, weaknesses, opportunities and threats analysis) were used to implement this action. Summary of the procedures in the analysis is presented in the Figure 4.2-1.

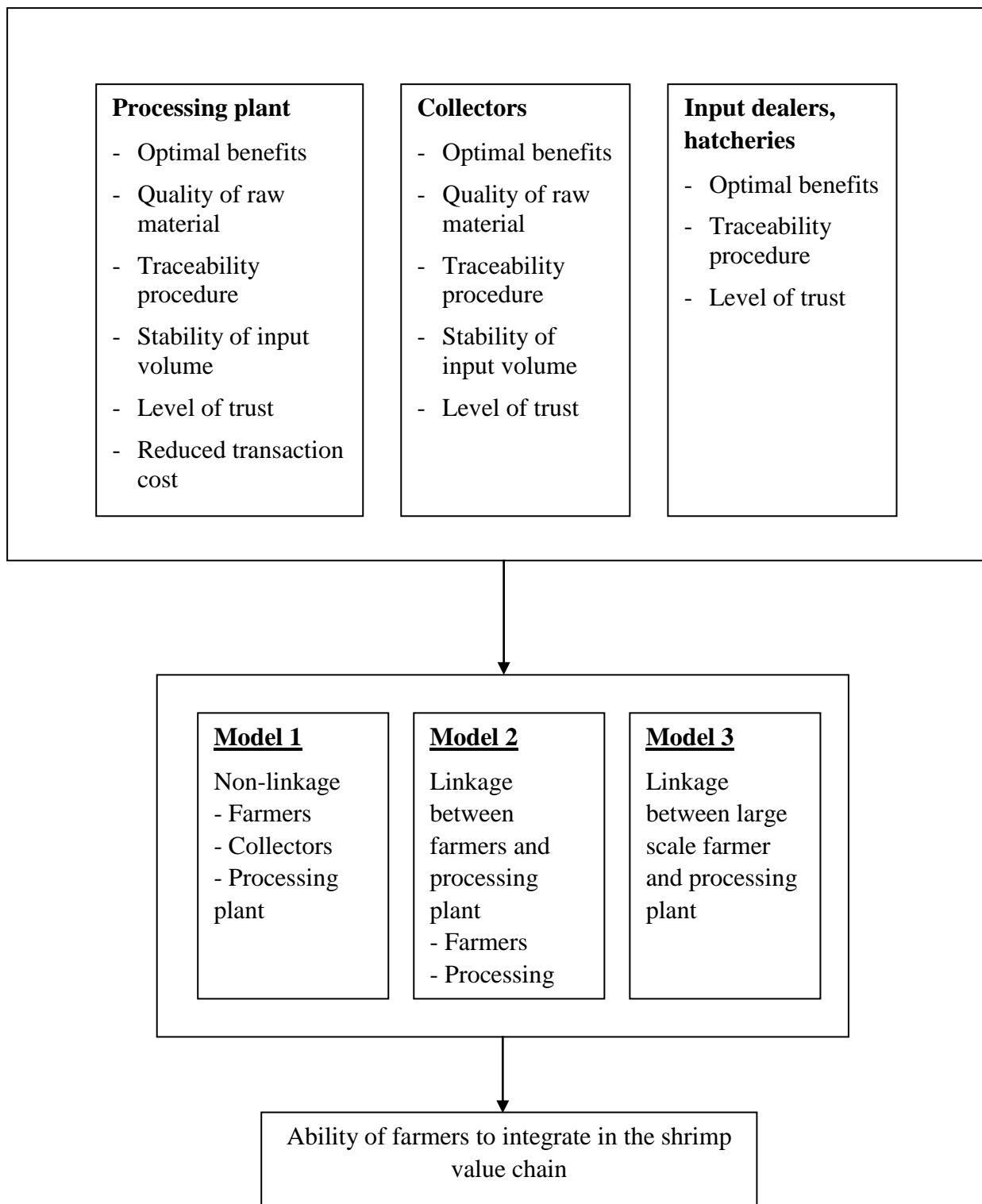


Figure 4.2-1 Factors affecting the ability of farmers to integrate in the shrimp value chain

4.2.2 Describing and analysing exogenous factors (key drivers, socioeconomic and policy environments, institutions, and the market trends) affecting different value chains, and farmers' ability to integrate

Analyses of exogenous factors affecting the shrimp value chain included the regulated system, organization and monitoring, and the socioeconomic, policy, and institutional environments which improve and protect the vertical value of the shrimp value chain. This implies that reciprocal affects among actors in the shrimp value chain are not random. It is organised in a system that satisfies the demand for shrimp products. Analysis of how the shrimp value chain is managed helped identify areas where intervention is needed to improve the effectiveness of the shrimp value chain as well as farmers' abilities to integrate.

Questions emerging from the action:

- 1) What are the official and unofficial principles, and the socioeconomic and institutional environments affecting the actors' activities?
- 2) Who creates these principles, and the socioeconomic and institutional environments?
- 3) Who monitors the enforcement of these principles, and the socioeconomic and institutional environments?
- 4) What made these principles, and the socioeconomic and institutional environments effect the development of farmers?
- 5) Why does the sector need these principles, and the socioeconomic and institutional environments?
- 6) What are the advantages and disadvantages of these principles, and the socioeconomic and institutional environments for each actor in the shrimp value chain, especially for the farmers?

In order to answer the above questions, it needed to conduct surveys with open questionnaire. The surveys was conducted to find out the operational principles of the shrimp value chain, the sectors that are responsible for establishing the shrimp value chain, and the current mechanism for monitoring their activities. Besides, the socioeconomic and policy environment, and the factors affecting world market trends were identified.

The processes involved in this phase included the following:

- Check all the participants that affect the operation of the different chains.
- Interview the participants in the different chain to identify the principles, and the socioeconomic and policy factors which affect the operation of the shrimp value chain, as well as farmers' ability to develop.
- Classify policy systems (governmental and provincial levels) that affect the development chances of farmers in different shrimp value chain.

The summary of these activities is presented in the Figure 4.2-2.

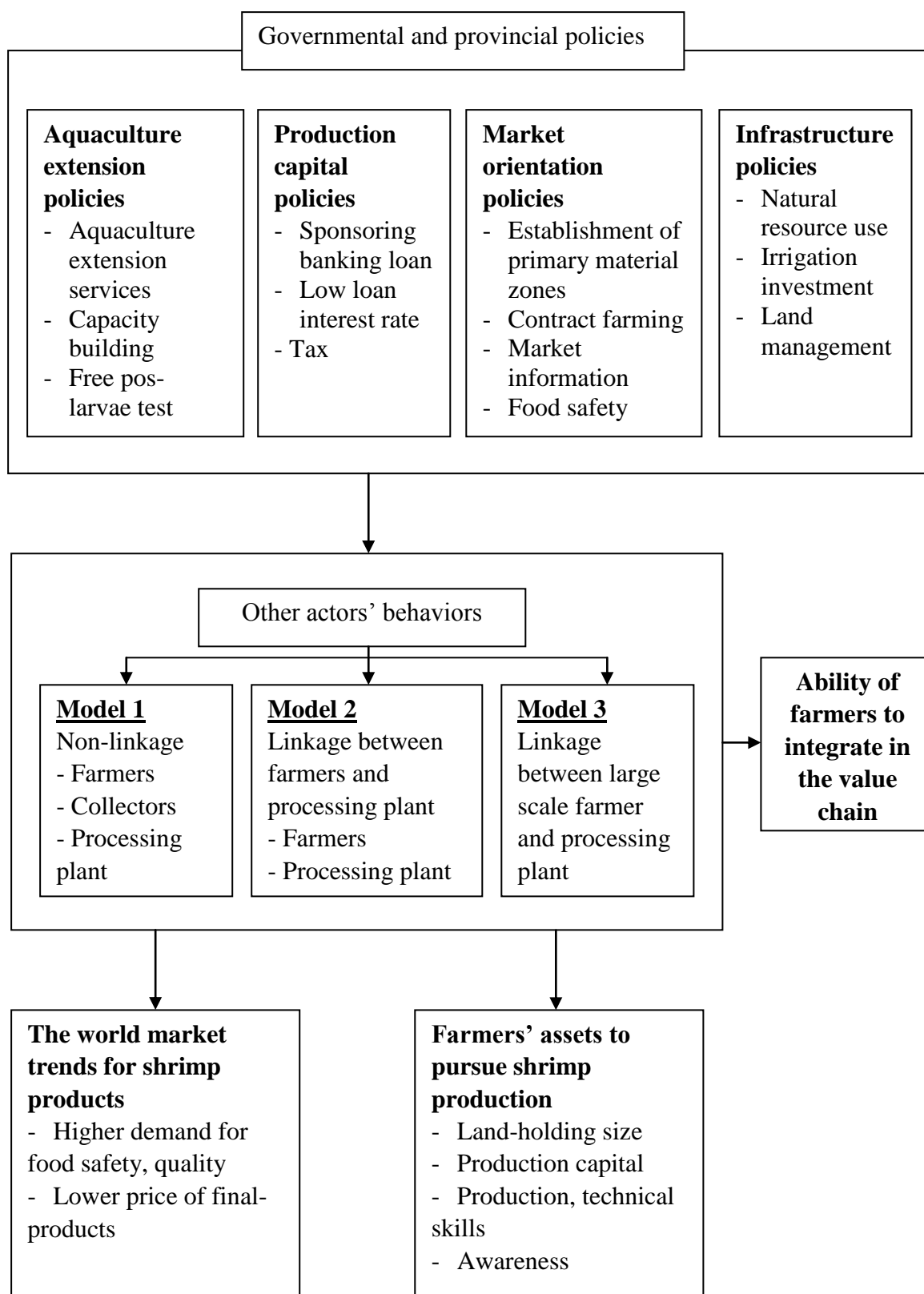


Figure 4.2-2 Government policies at the national and provincial levels and market trends affecting ability of farmers to integrate in the value chain

4.2.3 Evaluating the benefits derived by farmers in the shrimp value chains

This is to confirm the effectiveness in the production and marketing system of farmers. The benefits are defined as higher income, more reliable income and upgrading possibilities of farmers in the shrimp value chain.

The analysis and comparison among shrimp producers focused on the following: 1) intensive production type; 2) seasonality of shrimp production; and 3) farm scale indicated by the area of water surface of shrimp ponds;

Shrimp production costs include variable cost, fixed cost and hired labour cost. Variable cost accounts the cost of materials which are defined as costs of post-larvae shrimp, feeds, medicines, vitamins, nutrients, minerals and enzymes, water-treated chemicals, energy (fuels and electricity), pond dredging after harvesting.

Costs of depreciation include the costs of pond and dike construction, water pump, aerator, paddle-wheel expenditures, protection net and other sub-materials.

Summary of analytical framework of the study can be expressed in the Figure 4.2-3.

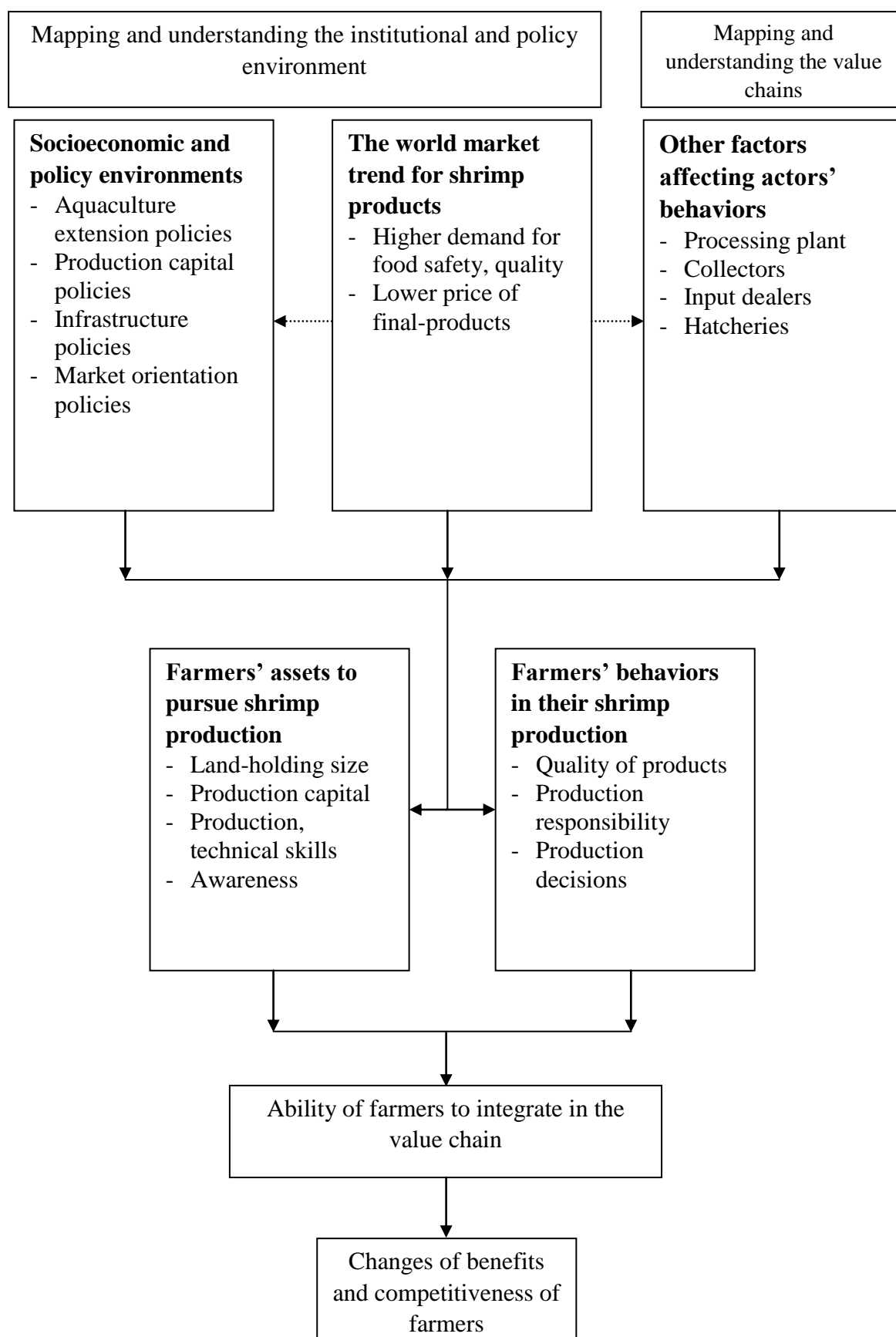


Figure 4.2-3 Analytical framework

4.3 OPERATIONAL FRAMEWORK

4.3.1 Data source

As mentioned in previous sections, data sources of this research were supported by documentary collection as well as discussions and surveys. The main surveys were conducted in three provinces in the Mekong River Delta, namely Ben Tre, Soc Trang, and Bac Lieu provinces. Each province showed the different model of shrimp value chain in the region.

Basing on the available results of the project “*Improvement of shrimp product quality exported to Europe through building up capacity of shrimp producers, private sector and local authority in Bac Lieu province*” funded by EU Commission to Vietnam in 2005, the research continued with the survey at farm household in Vinh My village, Bac Lieu province in 2006, 2007, 2008 and 2009 to understand the evolution of shrimp culture at farm level.

The survey in Ben Tre and Soc Trang were conducted in 2008 and 2009 to showcase the linkage chain model between small scale production farmers and processing plants through contract farming and its failure. On the other hand, the province of Bac Lieu is the second largest shrimp cultivator in the region and representing the non-linkage model. Soc Trang presents for the model of linkage between large scale production farmer and a processing plants. Ben Tre provides information of vertical integration under contract farming form between small scale farmers and the processing plant.

Three provinces account for more than 70% of total volume of shrimp production in the Mekong River Delta and have typical production conditions as other provinces in region.

Secondary data was gathered from the statistical year book of government ministry and target institutions.

Data was also obtained from a system of documents and regulations of the Ministry of Agriculture and Rural Development, local governments and international organisations transmitted to shrimp producers; central and local governments’ annual reports, previous studies’ results of research institutions and universities; training documents and activity reports of local administrative organizations and Extension Services for Aquaculture.

4.3.2 Sampling method

The criteria to be used in selecting research sites were based on the typical shrimp production conditions, cultivation areas, its representation for agro-ecological systems and type of value chain in the region. Hence, Mekong River Delta in general and Ben Tre, Soc Trang and Bac Lieu provinces in particular were chosen as the study zone.

The Mekong River Delta occupies more than 70% of total area for shrimp production in the country and accounts for 75.8% of the country’s total volume of production. Shrimp production in the Mekong River Delta is concentrated in coastal provinces such as Bac Lieu, Soc Trang, Ca Mau, Ben Tre, with active area more than 544,8 hectares. The land area devoted to shrimp production in the provinces of Ben Tre, Soc Trang, and Bac Lieu is around 77.2% of total shrimp production area of the region.

Shrimp production in Bac Lieu has been developed in Gia Rai, Phuoc Long and Hoa Binh districts since 1999. According to research results of the project VN/SPF/06(101040), Hoa Binh district contributed the greatest percentage to the total shrimp production area in Bac Lieu province (24.17%). Therefore, Vinh My A village in Hoa Binh district was chosen as the

research site due to its typical shrimp production characters and production types that could be representative for Bac Lieu province as non-linkage shrimp value chain. The empirical data was based on field surveys that will take place for two production seasons in four years 2006, 2007, 2008 and 2009. The questionnaires were distributed to 39 shrimp production households in 2009, 38 households in 2008, 49 in 2007 and 56 in 2006. Among them, respectively 16 households in 2006, 18 households in 2008 and 23 households in 2009 were having two seasons a year.

Similar to Bac Lieu, Ben Tre province was chosen due to its shrimp production characters, and its contribution to the total production area of the region. Furthermore, Ben Tre is known as the pioneer in co-management and cooperation between shrimp farmers and a processing plant in the region. This linkage was made up of nine groups of shrimp farmers and one processing plant. The nine groups were located in Binh Dai (3), Ba Tri (3) and Giong Trom (3) districts with around five to ten intensive shrimp producing farmers in each area. However, the this linkage model got failure after two years of operation due to the drop out of main actor in the shrimp value chain – processing plant. For this reason, the study chose one processing plant and 10 farmers representing for each group to observe and find out reasons of its failure.

Apart from linkage and non-linkage models in Ben Tre and Bac Lieu, Soc Trang known as the pioneer in the linkage between a large scale farmer and a processing plant. Therefore this province was also chosen to analyse the new models of shrimp production in Mekong River delta. Up to now, there is only one large scale farmer cooperate with processing plant. Hence these two actors were chosen for study.

Take into account of the similar of production conditions, production skills, natural resources, and climate the study paid attention on farmers' intensive production type which presents the largest harvest volume (65%) of the sector as well as strong impact to quality of output products. The study was taken into account the similarities in production conditions, production skills, natural resources and climate by paying attention on farmers' intensive production systems which produces the largest volume of fresh shrimp harvest at 65% of total, and how the primary product impacts on the quality of output products.

Besides the interview of farmers, discussions with the other actors in the shrimp value chain also were realized in the research activities. Due to the very difficult contact with processing plants and the limitation of time to spare for an interview, thus, only one processing plant was chosen for each province with an existing contract farming agreement with shrimp farmers in Ben Tre and Soc Trang provinces.

Note that the management of the processing plants has the sole authority to set the criteria on choosing input supplies and the collectors.

A profile of the respondents of the study is presented in Table 4.3-1.

Table 4.3-1 Profile of respondents

Location	Respondents	Number of person	Notes
Ben Tre province	Shrimp production farmers, linkage	10	From nine groups of farmers joining in the contract
	Processing plant	1	Joining in the contract
	Extension officers	1	
	Provincial officers	1	
	Government officials	1	
Bac Lieu province		39 (2009)	
	Shrimp production farmers, non-linkage	38 (2008)	
		49 (2007)	
		56 (2006)	
	Processing plant	1	
	Input dealers	3	
	Hatcheries	3	
	Extension officers	4	
	Provincial officers	2	
	Government officials	1	
Soc Trang province	Large scale farmer	1	Joining in the contract
	Extension officers	1	
	Provincial officers	1	
	Government officials	1	

4.3.3 Method of collecting data

By approaching a participatory research, participation of target groups into the study process is fully respected to ensure a consistent cooperation between researchers and beneficiaries of the project. The methods of implementation will be:

- Participatory Rural Appraisal (PRA) and Key Informants Panel (KIP): these methods are well-know and very useful to conduct research in field of rural development. The PRA will be applied for the preliminary study on shrimp production at the target region and target groups. Implementing this method to get opinions of target groups and key persons, as well as information concerning to aims of the study. The method relies on participation of interviewees into research procedures in order to ensure information accuracy and reflections of local community. Involving activities would be discussion to interviewees' group, discussion to key informants, getting ideas, evaluations and potential solutions of local community about study's issues.
- Formal and informal interviews through prepared questionnaire or opened question: aims are to collect data for statistical analysis of the study. This method was mainly applied in the direct discussion to people those are responsible for different organizations at different levels. They were local authorities at the village, district and

province. They included leaders and staff of administrative or technical organizations as the People Committees, the Farmer Association, Provincial Department of Aquaculture, Department of Resources and Environment, Department of Sciences and Technologies, Extension Service for Aquaculture, Shrimp Export Enterprises and other related institutions.

Documental research: it aimed to collect relevant information, institution and policies of Vietnam's government on concerned to shrimp production. It focused on published standards and regulations or at the enterprise itself.

4.3.4 Methods of analysis

This research only focuses on intensive production system in which farmer has a large harvest volume but is likely to be affected by several production problems during season. Therefore, the prepared questionnaires and distribution of research sample have been designed to reflect this situation prevailing in the village. Two types of production costs were taken into account for the analysis, namely fixed and variable costs.

In this research, fixed costs were taken into account only for the years 2008 and 2009 as for other years, some parameters were not available. Land purchase cost has not been included based on the assumption that farmers own this resource as an asset for a given years independently from the production activities undertaken. Fixed costs consist of pond, water preparations, involving fertilizers and seeding of pond, depreciation. Machineries and equipment maintenance costs were considered as other fixed cost.

Depreciation encompasses excavation and investments in electric paddlewheel, water pump, seine and bamboo. These expenses are depreciated on an annual basis and in a straight line based on the real use and farms production experience, counting on a 2 season-used for seine and bamboo, a 7 year-used for electric paddlewheel and water pump. The expense for excavation had a depreciation of 10 year-used because most of farmers need to reconstruct the pond after this period if they want to continue their cultivation.

Variable costs comprise post larvae, feed, chemicals, hired labour and interest charge. Based on observations made during surveys implementation, this research focuses on 4 main categories of variable costs, namely post larvae, feed, chemicals and labour costs. The remaining costs are gathered into other variable cost.

The research focuses on shrimp production evolution at farm level from 2006 to 2009 by comparing production parameters as follows:

- Input costs;
- Stock density;
- Yield;
- Selling prices;
- Output volume.

All estimates are based on the observed year current prices as well as on constant price of 2006.

Compare mean by One-way ANOVA was utilised to analyse and put in evidence the annual variation in terms of production and T-test is used to analyse the seasonal crop variation within the same year.

Descriptive statistics was also applied to analyse the reciprocal effect and inherent relations among actors in the shrimp value chain, and to explore exogenous factors (socioeconomic and policy environments, institutions, and the market trend) that affect the chance of farmers in different models.

Factor and economic analysis was used to understand well the models of linkage as well as non-linkage between farmers and processing plants.

The research utilised the SWOT analysis method developed by Jan Helder (2010) to analyse the internal and external factors that affect to actors behaviours as well as to draw out the main objectives that actors should conduct to develop their activities.

Stakeholder analysis

The research uses the Stakeholder Analysis method created by the Department for International Development (DFID, UK) to analyse primary actors in the shrimp value chain.

Stakeholder analysis is a political assessment to identify, prioritise and understand all stakeholders in the value chain. It results mostly in deciding whose influence to strengthen and whose influence to minimise. It is therefore typically a tool to limit number of change initiators assess the opportunities and threats other stakeholders pose to positively answering the business questions.

There are three steps of stakeholder analysis. The first one will be an identification of the key stakeholders in the analysis and planning stage of a change process, and an assessment of their interests and the way in which these interests are likely to affect the process. By having brainstorming, this will helps to results in deciding whom to involve in which way in the analysis and planning process, and who have influence of power or have an interest in its successful or unsuccessful conclusion of actors. In this step, both primary and secondary actors must be included to be sure that the identification is correct individual stakeholder within a stakeholder organisation

Second step of stakeholder analysis is to prioritize stakeholders. This step will rank the important position of actors that affect to the current analyzing one. The ranking is listed from the highest to the lowest position basing on the list of actors and organization that affect current analyzing actor. A table of position in decision making and impact on the value chain will be drawn out (Table 4.3-2). The third column presents the position of stakeholders that affect decision making of current analyzing actors. The last column shows the impact of stakeholders on the value chain.

Table 4.3-2 Stakeholders analysis

Stakeholder group	Primary activity	Position in decision making system ⁽¹⁾	Impact on the value chain ⁽²⁾
Actor 1		A	A
Actor 2		B	B
Actor 3		C	C
Actor 4		D	D
Actor 5		E	E

⁽¹⁾ The letters A, B, C, D, E can get the value from 1 to 5 according to the important position of the actor in decision making system of the current analysing actor.

⁽²⁾ The letters A, B, C, D, E can get the value from 1 to 5 according to the impact of the actor on the value chain.

Mapping out the stakeholders on the *Importance and Influence Matrix* (Figure 4.3-1) to show clearly their relations is one action of the second step.

The last step of Stakeholder analysis is to understand the key stakeholders in the value chain. It needs to know more about key stakeholders and how they are likely to feel about and react to current analysing actor.

In brief, stakeholder analysis is a tool to analyse whom to involve in which way in the institutional development and organizational strengthening diagnosis process. The participation matrix that concludes stakeholder analysis can be applied in many settings. It lists the involvement of external actors in the diagnostic process. The matrix can additionally include internal actors, such as departments and individuals within an organisation.

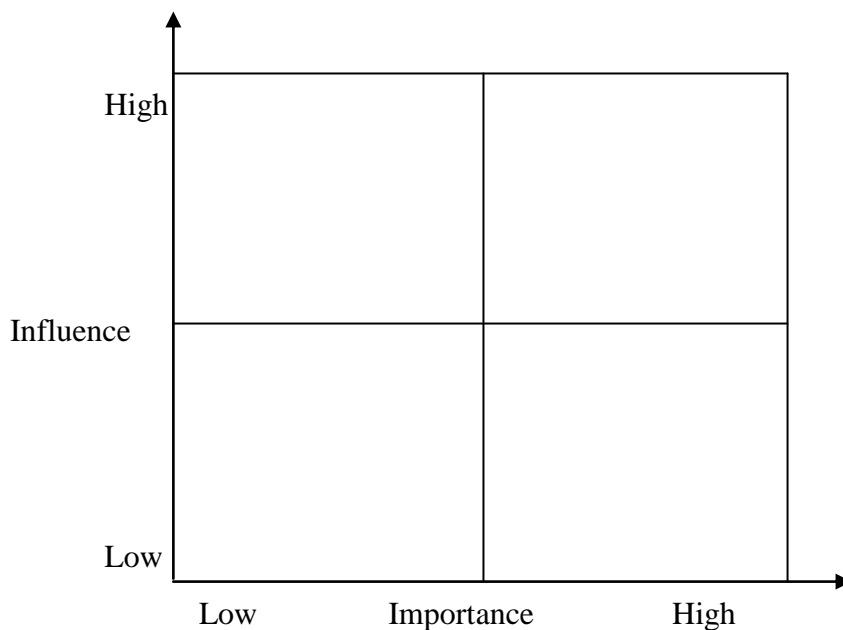


Figure 4.3-1 Importance and influence matrix

Clustering shrimp farmers

As observed in the Mekong Delta, farmer's technical level has strongly affected the input production costs as well as the production efficiency of shrimp cultivation. Farmer's technical level is presented through level of investment, in which stock density (post larvae/m² of water surface) is one of most important parameters influencing shrimp harvest volume. Stock density shows the intensity level that relates to average input costs/m² of water surface. A high stock density leads to high input costs. In principle, shrimp production and yield are directly proportional to stock density. However, some external factors such as weather or disease may affect this density and subsequently production yield. Clustering shrimp farm in this research is therefore only based on input costs without using or combining output costs.

In order to determine the clusters center, K-mean method is used to divide shrimp production into three clusters per year to identify variations.

Clustering parameters:

- Production year (2006, 2007, 2008 and 2009);
- Production season;
- Variable cost.

Variables were used to cluster as follows:

- Total water surface (m²);
- Stock density (post larvae/m² of water surface);
- Fixed cost/ha;
- Post larvae cost/ha;
- Feed cost/ha; and
- Chemical (pesticide) cost/ha.

Cluster analysis results showed that respectively 28 observations made in 2009, 35 in 2008, 45 in 2007 and 51 in 2006 seem having the same shrimp cultivated characteristics in the first crop season. In the second crop season, respectively 12 observations made in 2009, 16 in 2008, and 13 in 2006 were having the same shrimp cultivated characteristics. These observations were put in one cluster for each year to compare it with others.

CHAPTER 5. MAPPING THE SHRIMP VALUE CHAIN IN THE MEKONG RIVER DELTA, VIETNAM

This chapter will develop a sharing understanding of market structure for primary and secondary actors of shrimp value chain in the MRD, Vietnam. By mapping the shrimp value chain, the flows of products, key actors will be described clearly. It will also provide information to understand a framework for organizing the sector as well as activities in the future.

The chapter will be divided into two parts. The first one will map the shrimp value chain and the last part will focus on farmers, the main actor who needs to follow up.

5.1 MAPPING THE SHRIMP VALUE CHAIN IN THE MEKONG RIVER DELTA

5.1.1 Shrimp value chain

The shrimp value chain in the MRD starts from input suppliers namely input dealers and hatcheries to supply input to farmers such as post larvae, feed stuffs, chemical, fuels, and net.

Figure 5.1-1 shows the complicated value chain of shrimp in the MRD with three flows of shrimps from farmers to markets. The main flow of shrimp raw material is from farmers to collectors at level one with about 95% of the total shrimp raw material production of the MRD. These collectors will buy shrimp from other collectors at level two and three to supply to processing plants at a volume about 97.5%. Only 1% of shrimps of collectors level one was sold to the local markets.

Other flow of shrimp raw material from farmers to collectors level three accounts for about 4.5% of the total shrimp production in the region. From collectors level 3, shrimp will be sold to collectors level two and one, and local markets with the percentage of 3; 0.5; and 0.5 respectively.

Shrimps sold directly from farmers to the market were found in both extensive and semi-extensive cultivations that the harvest volume is low. Some other cases of selling directly shrimp to the markets is failure farms when their shrimps are died at the mid season.

Flows of shrimp in the Figure 5.1-1 also show the actors who hold the main powers in the shrimp value chain, namely collectors level 1 and processing plants. These two actors are the leaders in the shrimp value chain in the MRD where they play a key role to determine shrimp prices and have significant influences to other actors.

The main roles of each actor in the shrimp value chain will be discussed more details in the next sections.

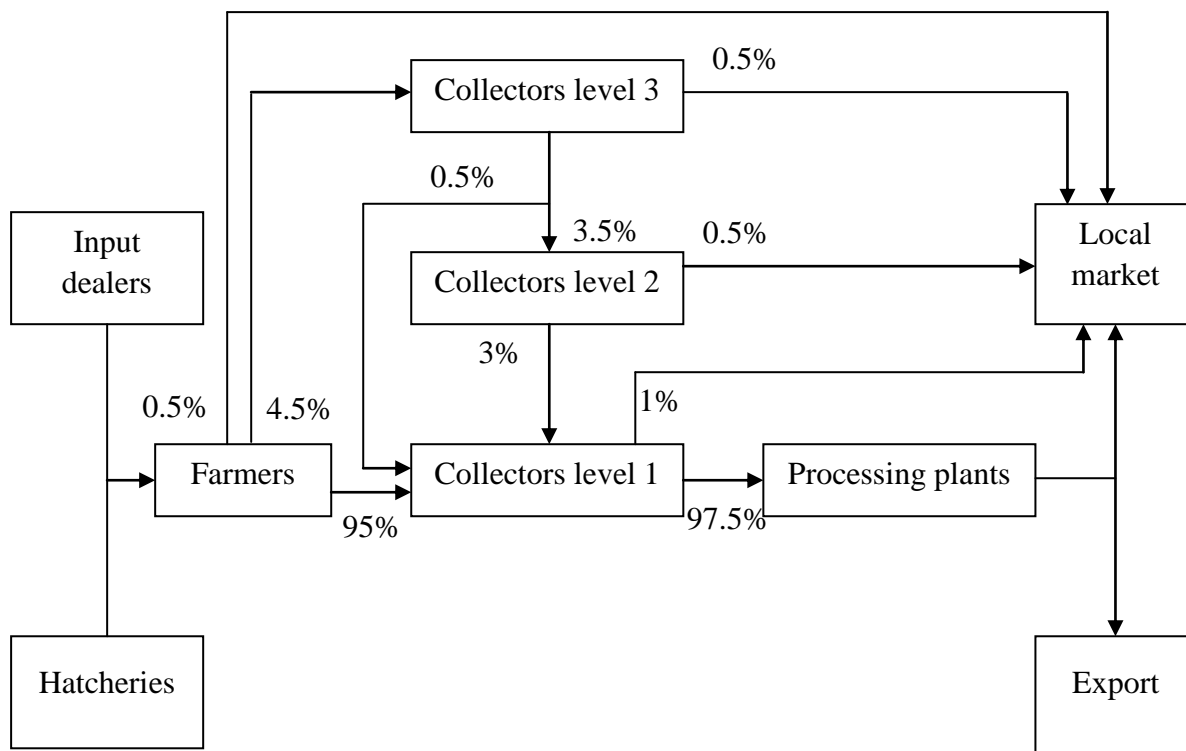


Figure 5.1-1 Shrimp value chain in the MRD

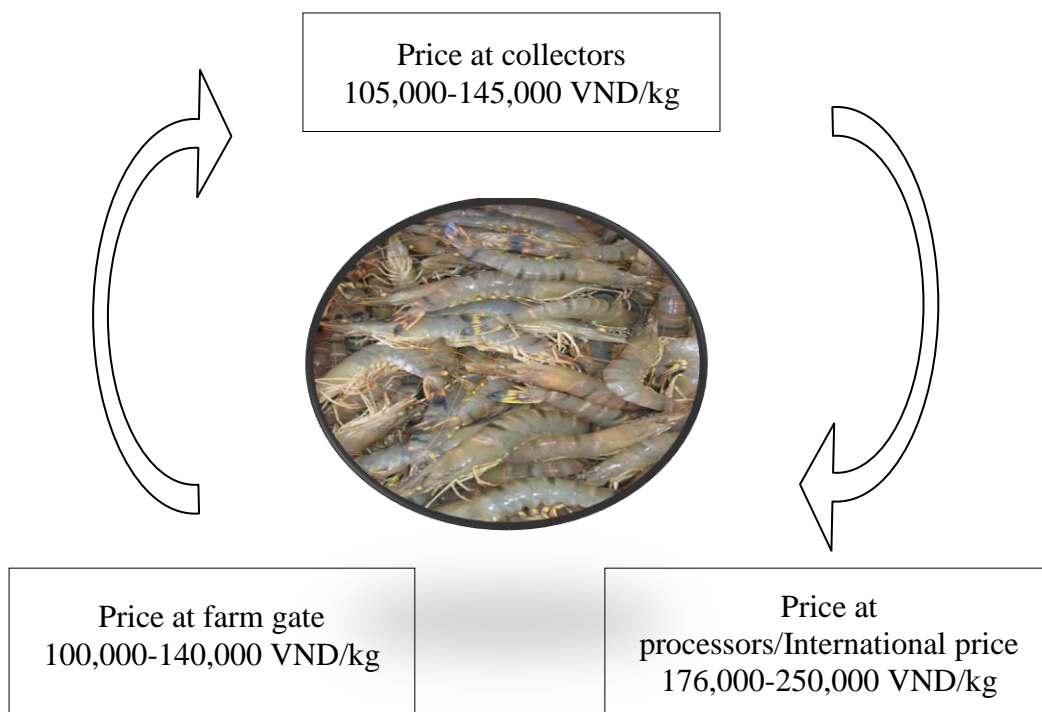


Figure 5.1-2 Shrimp selling prices in 2009

Figure 5.1-2 presents the selling prices of Vietnam shrimp from the farm gate to international market in 2009. The selling price of shrimp sets for the size from 20-40 head/kg. The price at farm gate was from 100,000-140,000 VND/kg. The collectors bought shrimp from the farmers and sold to the processing plants at the prices from 105,000-145,000 VND/kg depended on the size and the level of pre-processed shrimp. The processors, at the same time playing as the exporters, sell their shrimps to the importers at the prices from 176,000-250,000 VND/kg.

5.1.2 Main products of the shrimp value chain in the MRD

There are two main product types of MRD shrimp value chain sold in the markets. The first type is whole fresh shrimp, also known as head on shell on (HOSO), and second one is prepared products with various forms such as headless fresh shrimps, HOSO frozen shrimps; headless, shell on, block frozen shrimps; raw peeled, deveined, tail off shrimps; cooked, easy peel shrimps; cooked HOSO shrimp; cooked, peeled, deveined, tail off shrimps; cooked, deveined, tail on shrimp; and butterfly shrimps (Figure 5.1-3).

HOSO fresh shrimps after harvested from farmers' farms will be transported to collectors or local markets. Most of farmers' shrimps are sold to collectors while just a small volume is sold directly to the markets. Shrimps sold direct to market are from extensive and semi-extensive farms. Few of them are from intensive farms when they have unexpected problems of diseases and the collectors refuse to buy due to no market from processing plants. In this case, farmers will try to make up some amount of money by selling their shrimps to the local markets.

HOSO shrimps from farmers to processing plants existed from the year 2006 to 2009 through farming contracts between these two actors in Ben Tre and Soc Trang provinces. However, this flow was broken in 2009 due to the waivers of the contractors. At present, there is no direct flow of shrimps from farmers to processing plants.

Outputs of collectors level 3 is only HOSO fresh shrimps while collectors 2 and 1 include HOSO fresh and headless fresh shrimps. Raw materials of processing plants are only purchased from collectors level 2 and 3.

Main traditional products of the MRD shrimp processing plants exported to Japan are nobashi (straightened shrimp), cocktail shrimp, individual quick frozen (IQF) shrimp, sushi shrimp, and panko ebi (Ebi fry or fried shrimp). About seventy percent of shrimp exported to the United State and EU markets are HOSO, headless fresh shrimps, HOSO frozen shrimps; headless, shell on, block frozen shrimps; raw peeled, deveined, tail off shrimps; cooked, easy peel shrimps; cooked HOSO shrimp; cooked, peeled, deveined, tail off shrimps; cooked, deveined, tail on shrimp; and butterfly shrimps account 70% (Kagawa, 2003).

In the recent years, live fresh shrimps are also exported informally to China by the collectors level 1 which have brought higher farm gate prices for farmers.

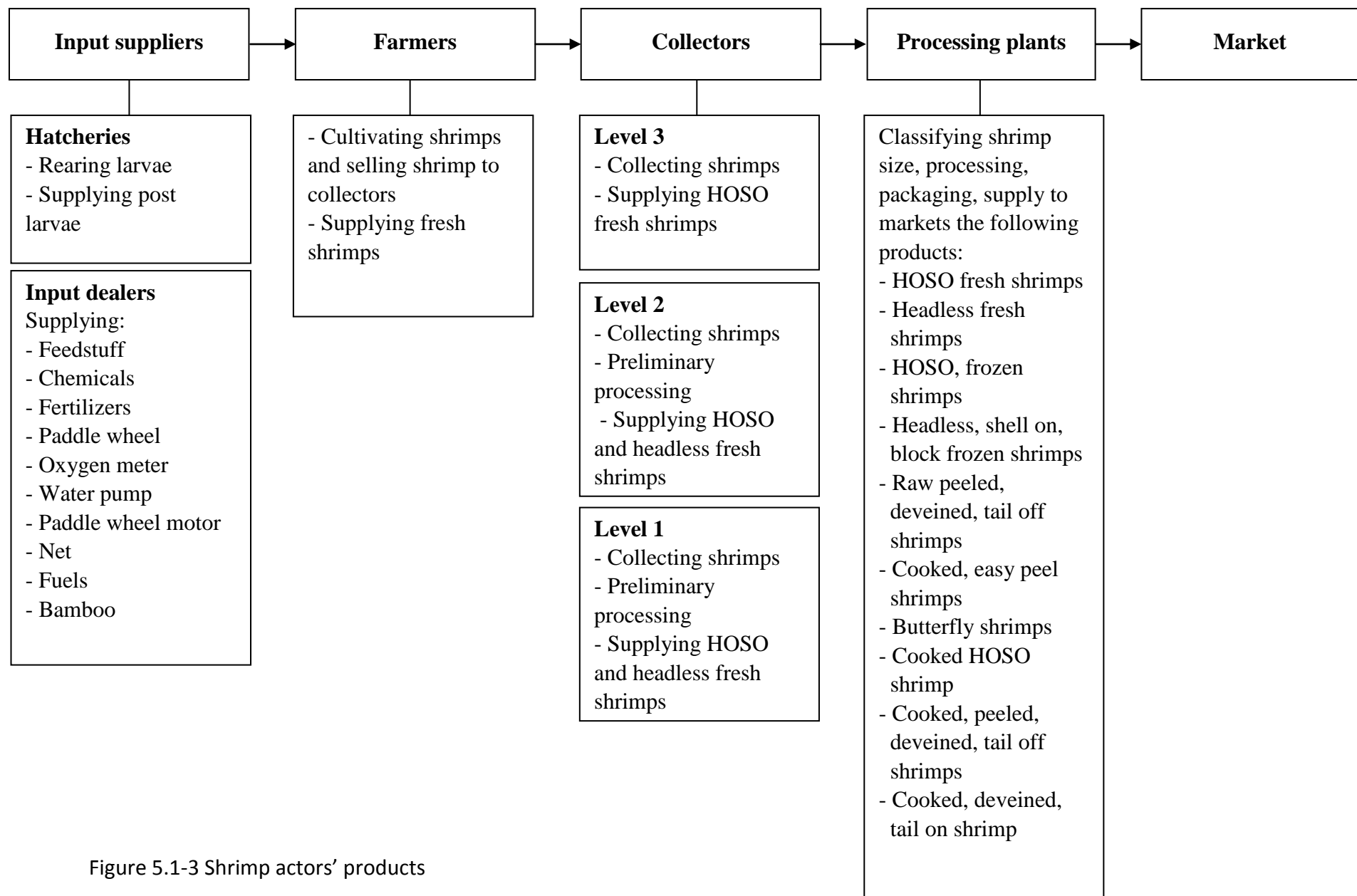


Figure 5.1-3 Shrimp actors' products

5.1.3 Primary actors of shrimp value chain in the MRD

In order to improve the shrimp value chain and shrimp quality sold in the markets, it needs to consider all aspects of the range of steps in the chain of events from production to consumption, including both opportunities and constraints, and the demand and supply of necessary products and services.

Taking into account of the value chain approach, primary actors of shrimp value chain in the MRD can be addressed as input dealers, hatcheries, farmers, collectors level 1, collectors level 2, collectors level 3 and processing plants (Figure 5.1-1).

5.1.3.1 Input dealers

Input dealers in the shrimp value chain in the MRD have economic relationship with farmers and input production factories (Figure 5.1-4).

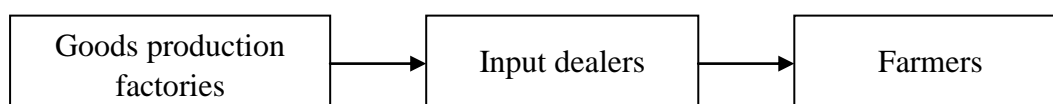


Figure 5.1-4 One step back and one step forward of input dealers

The input dealers in the shrimp value chain play their role to supply inputs for farmers to cultivate shrimps. The main goods delivered by input dealers are feedstuffs, chemical, pesticides, fans, fertilizers, paddle wheels, oxygen meters, water pumps, paddle wheel motors, net, fuels, and bamboo. This actor frequently contacts directly with farmers to provide market information, prices and product varieties as well as informal credit loans under the form of post-paid.

There are two forms of payment between input dealers and farmers including post cash paid and spot cash paid. Input dealers will decide when farmers can have a post-paid basing on current state of farmers' shrimps in the ponds. Normally, input dealers apply the post-paid when shrimps of farmers reached two months after starting the new season in order to be sure about farmers' harvested shrimps otherwise they will refuse to give a loan. Purchasing prices given by input dealers will be counted an interest which is a little bit higher than interests of banks. Farmers will return their loans at the end of season after selling their harvest shrimps. This type of payment is popular in the MRD due to no mortgage loans applied by input suppliers and lack of financial capital of farmers. Just few of farmers pay cash on the spot for their shrimp production inputs.

Input dealers have three levels from 1 to 3, of which, dealers level 1 are the distributors who buy input material at the factories and sell them to input dealers level 2. Input dealers level 2 will buy their goods to sell to input dealers level 3. Normally, input dealers level 1 is located in a big town while input dealers level 2 are located in the district and input dealers level 3 set up their shops in the villages. Data from an investigation in Bac Lieu province shows that, there are at least three input dealers supplying goods for shrimp farmers in each village. Both whole sale and retail sale are applied in input dealers level 1 while input dealers level 2 and 3 usually have retail one. More than 70% of farmer buys inputs for their shrimp cultivation at

dealers in the district where they live while 18% of them buy at the dealers in the villages (Figure 5.1-5).

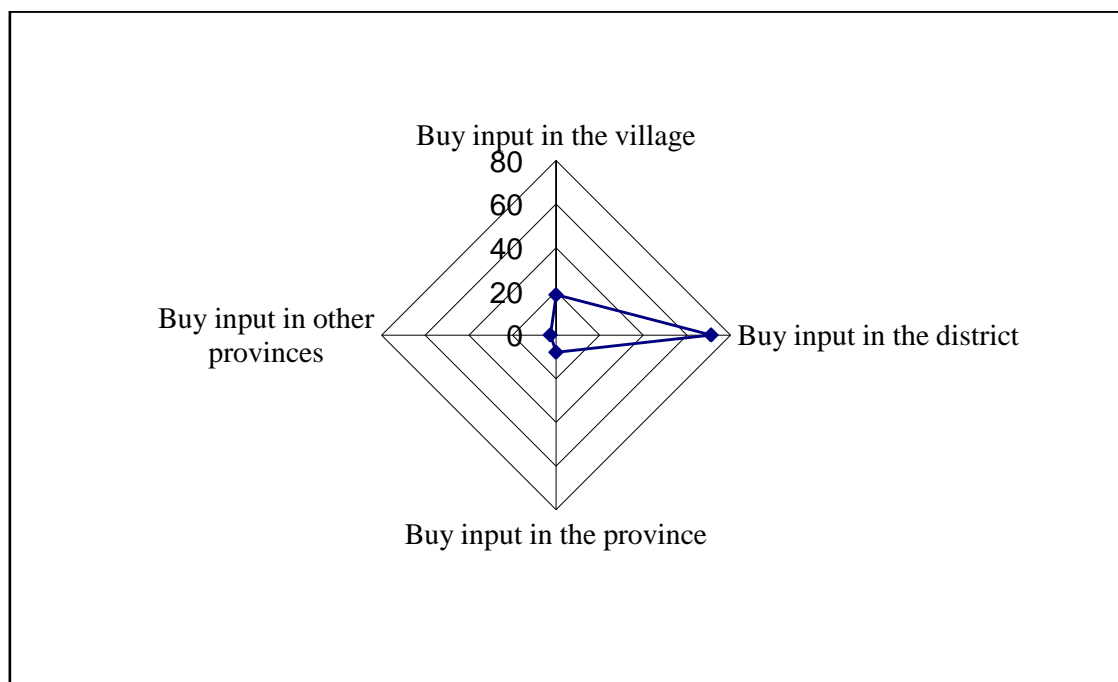


Figure 5.1-5 Farmers' place to buy input for their shrimp cultivation

In order to run its business, along with a business license issued by local authority, input dealers must have another license issued by Department of Agriculture and Rural Development of the province where the dealer locates. This license will certify that the dealer has enough capacity and meet all criteria such as labour's health, fishery input business certificate, and storages to play their roles.

Every six months, DARD staff will come to input dealers to check if they still meet all business criteria. If so, they are ranked as dealers A and can continue their business. If having any problem of quality management, they will be classed as dealer B and got a penalty. Besides, they have to improve their situation to be back to input dealers A. The frequency of checking by DARD for these dealers will increase till they meet all criteria again. In some case, with the second fine got from DARD staff, the dealers will be classed as input dealers C that they might not be allowed to run their business.

Input dealers stakeholder analysis

There are six actors that have interrelationship with shrimp input dealers in the MRD namely farmers, input production factories, transporters, bankers, local authorities and themselves.

As ranking the position in decision making system, input dealers, themselves, always have strongest decision to deal with their business because they need to have enough capacity on knowledge as well as financial capacity. Farmers and input production factories rank as 5 and 4, respectively due to their roles in the chain. Farmers are input dealers' customers and input production factories are their suppliers (Table 5.1-1).

Table 5.1-1 Input dealers stakeholder analysis

Stakeholder group	Primary activity	Position in decision making system	Impact on the shrimp chain
Input dealers	Supplying inputs for farmers	6	4
Farmers	Cultivating and supplying shrimps	5	6
Input production factories	Supplying goods and training for farmers	4	5
Transporters	Service providers	3	3
Bankers	Financial service providers	2	1
Local authorities	Providing enable business environment	1	2

Combined impact on the chain and position in decision making to the matrix of importance and influence (Figure 5.1-6), we found that local authorities have low influence and importance to input dealers' activities. This states that the government's roles on supporting this sector are still very low and not enough as it should be. Apart from issuing business license and quality monitoring, local authorities do not have the clear policies to support input dealers to develop their roles in the shrimp value chain.

Financial capital is one of important assets that input dealers need to satisfy. Most of input dealers in the MRD have very strong financial capital to buy goods and supply to farmers in the form of advance payment. However, not so many of them need to borrow money from the banks; therefore bankers do not stay in the high position in making decision of input dealers.

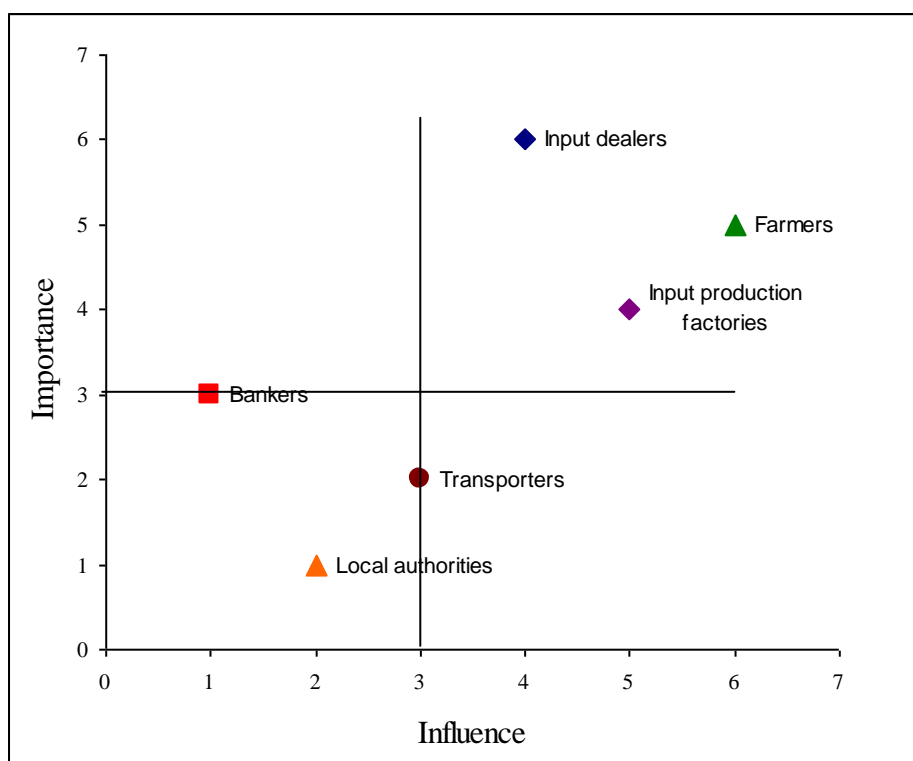


Figure 5.1-6 Importance and influence matrix of input dealers

SWOT analysis of input dealers

Input dealers in the shrimp value chain in the MRD usually have business skill to play their roles. They are dynamic and market-driven to supply inputs to farmers to keep the relationship with their goods suppliers. Most of them are information contactors of farmers and have strong trust with farmers in term of quality of goods and financial service. They often have shops at home with enough storage to handle their goods. However, due to their low technical skills and low education level to learn new technologies, many input dealers face on problems of quality management requirements issued by DARD. Furthermore, high financial capital requirements also harm input dealer to buy high quality goods to supply to farmers.

Nevertheless, shrimp production is still a sector that creates high interests of farmers in coastal area in the MRD. This gives an availability of markets for input dealers to continue with their function. The improvement of goods quality provided by factories also an advantage for input dealers to have farmers' trust. Post paid to factories after few months can help the input dealers have strong financial capital (Table 5.1-2).

Besides the above opportunities, input dealers still face some threats coming from the lack of government supports in terms of credit, quality management and market information to improve their activities. Apart from some training conducted by DARD, up to now, the government in general, and the local authority in particular does not have many efficient programs to assist this actor.

Table 5.1-2 SWOT analysis of input dealers

Strengths	Opportunities
<ul style="list-style-type: none"> - Having business skills - Having high financial capital - Availability of storages - Strong trust level with farmers 	<ul style="list-style-type: none"> - Availability of markets - Advance goods supplying by factories - Quality of goods increase
Weaknesses	Threats
<ul style="list-style-type: none"> - Low technical skills to handle chemical and goods - High capital requirement - Low education level to learn new technology 	<ul style="list-style-type: none"> - No support from government - High competitiveness among actors - Seasoning of shrimp production - Delinquent debt of farmers

Table 5.1-3 Objective design of input dealers

	Increase selling volume	Increase government's support	Reduce delinquent debt of farmers	Supply high quality goods	Increase production season
Having business skills	5	1	1	3	0
Having high financial capital	4	0	0	7	0
Availability of storages	3	0	0	6	1
Strong trust level with farmers	1	2	4	2	0
Subtotal (1)	13	3	5	18	1
Low technical skills to handle chemical and goods	6	0	0	7	0
High capital requirement	7	0	3	4	0
Low education level to learn new technology	2	4	0	5	0
Subtotal (2)	15	4	3	16	0
Total (1-2)	-2	-1	2	2	1

Combined all internal and external advantages as well as disadvantages of input dealers, an objective design can be presented in table 5.1.3-3. There are five objectives for input dealers to improve their business efficiency such as increasing selling volume from an availability of markets and quality of goods; increasing support of government; reducing delinquent debt of farmers; increasing volume of high quality goods; and increasing production season to reduce effect of seasoning.

From the result of harmful and helpful ranking to achieve the objectives, reducing delinquent debt of farmers and increasing volume of high quality goods to farmers get the highest scores to become two main strategies that input dealers need to follow for improving their business efficiency.

5.1.3.2 Hatcheries and nurseries

Product flow at hatcheries and nurseries

Hatcheries and nurseries supply post larvae to farmers in the shrimp value chain. Similar to the input dealers, hatcheries and nursery are also input suppliers for shrimp farmers' cultivation. They have the economic relationship with wild broodstock suppliers and farmers (Figure 5.1-7).

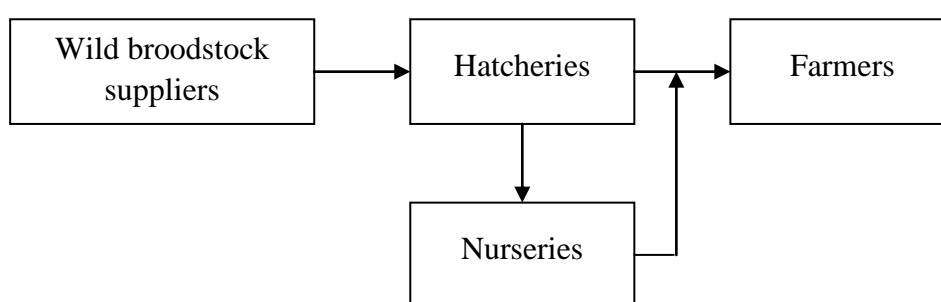


Figure 5.1-7 One step back and one step forward of hatcheries and nurseries

Operation of hatcheries and nurseries

The development of hatcheries started in 1984 around Qui Nhon and Nha Trang area after the establishment of FAO hatchery in Qui Nhon in 1982. It increased dramatically from 16 hatcheries with about a million post larvae in 1986 to the peak of 5,094 hatcheries with 259 billion post larvae in 2004 (Vu, 2009). There are about 900 hatcheries in the MRD (Loc, 2006). Most of hatcheries in the MRD are small-medium scales with production capacity at about 10 million post larvae per year (Hoang, 2006). They are often owned by the private sectors. Some of them are foreign investors who have high financial capacity to play their business. Presently, the market share of foreign companies accounts for about 90% of post larvae demand in the MRD (Doan, 2010).

The operation of hatcheries depends on wild brood stocks captured from the sea which accounts for about 90% of brood stock supplied in the market. Pond reared stock accounts for only 10% the total post larvae supply. The large percentage of wild broodstocks caused many problems of post larvae quality in terms of disease, because of no quality checking at the beginning. Shrimp broods are mainly selected based on characteristics of colour, body and ovarian sizes. They are mainly fed with hermit crabs, squid, blood cockle and pig liver while agars are fed for larvae to enhance reproductive performance.

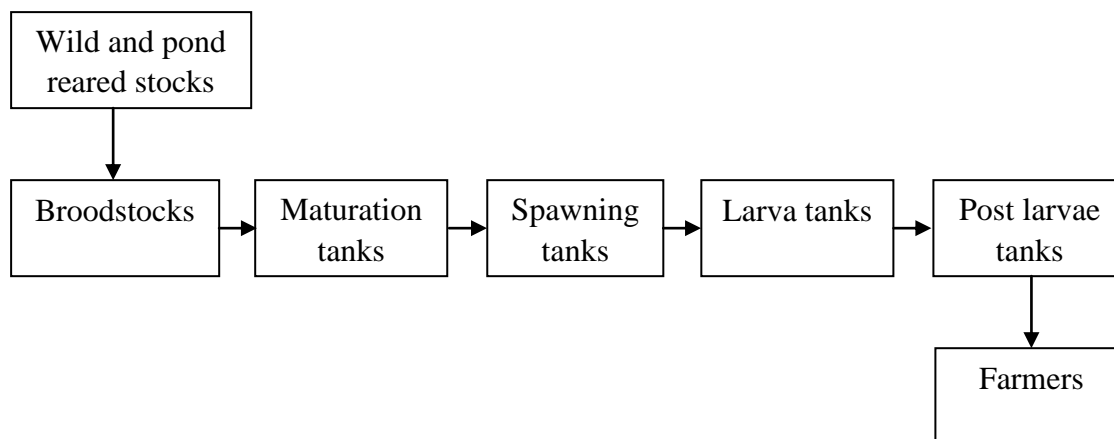


Figure 5.1-8 Post larvae operational process at hatcheries

Post larvae operational process at hatcheries starts from buying wild broodstocks or rearing-pond stocks from suppliers and ending at farmers (Figure 5.1-8). Wild broodstocks supplied by catchers in Khanh Hoa, Ninh Thuan, Binh Thuan, and Ca Mau provinces will be transported by train or car to hatcheries in the MRD.

At hatcheries, tanks will be utilised to rear females and males separately. Females will be unilaterally eyestalk ablated after three to four days of arrival. Matured female and male shrimps will be transferred to maturation tanks for natural mating. Gravid females will be taken out to other tanks for spawning with density is about four females/tank. Spawners are also taken out in the following morning after laid. Eggs will be transferred to larva tanks for rearing until post larvae. In some cases, larvae pass through nurseries for adapting to the farm production environment before delivered. The whole operational process takes about 12-15 days from hatching.

Female broodstock after spawning can be re-used three to four times in the maturation process, while males can be kept for several months, depending on broodstock health and tank conditions.

Disease often occurred in the hatchery operation due to the quality of broodstock and water management. The white spot (WSD) and the *monodon baculovirus* (MBV) are the two main diseases of post larvae. However, they are easily and quickly disinfected and re-opened without serious losses (Vu, 2006).

Post larvae market

Demand of post larvae is vary due to the change in farmers' cultivation, the level of intensification of shrimp farm development, as well as the success of both shrimp seed production and breeding activities (Vu, 2006).

A large amount of post larvae supplied to the shrimp farms in the MRD are imported from center provinces such as Binh Thuan, Ninh Thuan and Khanh Hoa which accounts for about 34.2%. Only 23.7% of farmers buy post larvae from hatcheries in their district while buying in different district in the same province is 39.5%. Hatcheries in the village supply only 2.6% of the total post larvae to farmers (Figure 5.1-9).

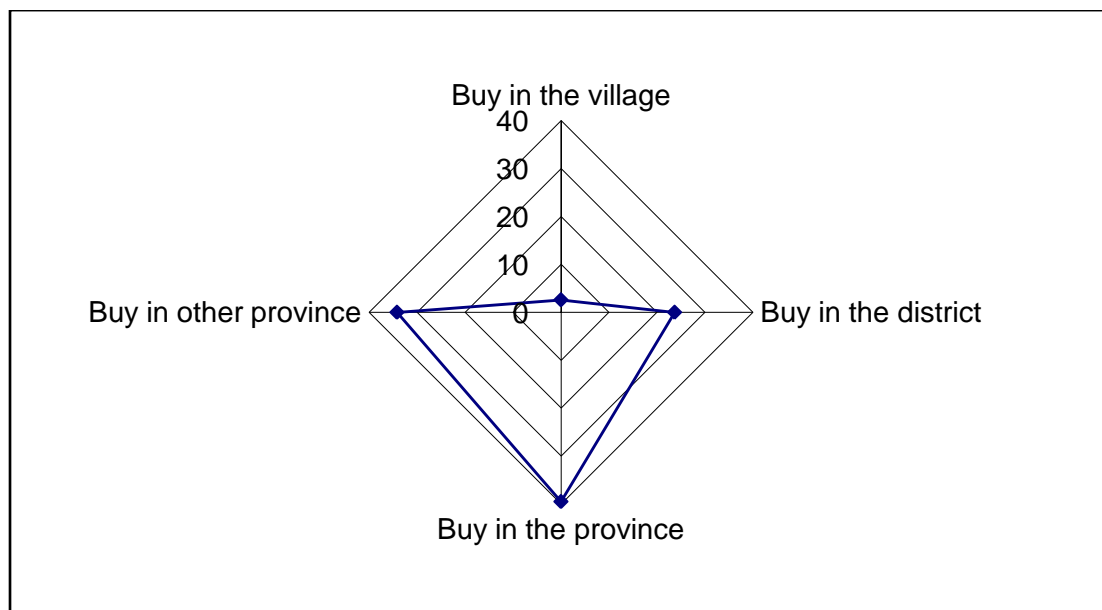


Figure 5.1-9 Farmers' place to buy shrimp seed

Up to date, the supply of post larvae can satisfy farmers' demand in terms of quantity. Nevertheless, prevalence of diseases and the low quality of the post larvae have resulted in huge damage to both the hatchery and grow-out sector (Hoa, 2009).

The quality of post larvae in terms of disease, such as the white spot (WSD) and the *monodon baculovirus* (MBV), will be screened at hatcheries if there is a request from farmers. However, all most all of farmers recheck in a neutral laboratory to be sure about the quality of post larvae before purchasing. According to DARD, approximately 20%-50% of the total post larvae sold in the market are inspected for origin and disease. However, the inspection is simple by perceptivity, therefore post larvae from uncontrolled sources are popular in the region that have affected yield and shrimp quality at the farms (Vo, 2006).

One hundred percent of farmers in the survey informed that hatcheries and nurseries have not given any warranty to farmers to assure their post larvae quality apart from disease tests.

Number of post larvae is calculated in a bowl. Hatcheries will first take a bowl of post larvae as a sample to count how many of post larvae are in, and then number of bowls will give the quantity of post larvae to buyers.

Differences from input suppliers, farmers have to pay 100% of spot cash for their post larvae. There is no informal credit source supplied by hatcheries due to a little amount of post larvae cost compared to total production cost of farmers.

Post larvae after buying at the hatcheries will be contained in a plastic bag with sea water and transferred to farm by farmers' motorbikes. Some will use public vehicles to transport post larvae if hatcheries are in central provinces. Consequently, post larvae are in poor condition after being transported for a long time.

Labours of hatcheries

At the early stage of hatcheries' development, technicians were not well concerned until the years 2000s. Staff of hatcheries at this time learned technical skill from experience exchanges, especially in Ca Mau province (Hoang, 2006). Based on the development of the sector and

their own demand, hatcheries awaked the importance of technicians in order to have success of business. Up to now, almost all hatcheries hire staff who hold engineering degree to conduct technical activities.

Besides, un-skill labours are also hired to work on other activities at hatcheries. Based its capacity, hatcheries decide number of workers to hire while family labours contribute a large effort.

Similar to input dealers, hatcheries have to get licenses from local authority and DARD to run their business. Though these licenses are issued, staff of hatcheries still has low technical skills to manage the quality of post larvae.

Hatcheries and nurseries stakeholder analysis

There are seven actors involved in interrelationship of hatcheries activities namely farmers, input dealers, broodstock suppliers, technicians, transporter, bankers and local authorities (Table 5.1-4). Input dealers and broodstock suppliers are input suppliers of hatcheries, farmers are its output market, technicians are technique providers and transporters play its role as service providers. There are not many hatcheries borrow money from the banks due to poor investment and low operation cost at hatcheries so that the position in decision making is ranked at two in comparison to other actors. Local authorizes provide enable business environment and business licenses for hatcheries. In some cases, they also organize training to support hatcheries to improve technical skills, however this support is not enough to compare with its roles.

Figure 5.1-10 shows the importance and influence matrix of actors involved in hatcheries activities, of which hatcheries located at highest position in the important of their business decision making. Next to hatcheries, farmers stay at the second position in hatcheries business activities and have strong influence to its decision making due to its role in the shrimp value chain. They are customers of hatcheries and strongly affect hatcheries' business plans as demand-driven. Broodstock suppliers and technicians rank behind farmers.

As mentioned above, there are not many hatcheries who borrow money from the banks, therefore bankers have not stayed at the important position in making decision of hatcheries. Similar to input dealers, local authorities have not had significant support to hatcheries to develop the sector. Presently, the position of the local authorities in decision making is not so important to hatcheries.

Table 5.1-4 Hatcheries stakeholder analysis

Stakeholder group	Primary activity	Position in decision making system	Impact on the shrimp chain
Hatcheries	Supplying inputs for farmers	8	7
Broodstock suppliers	Supplying broods for hatcheries	6	5
Farmers	Hatcheries' customers Cultivating and supplying shrimps	7	8
Input dealers	Supplying input for hatcheries	4	3
Transporters	Service providers	3	4
Technicians	Technique providers	5	6
Bankers	Financial service providers	2	2
Local authorities	Providing enable business environment	1	1

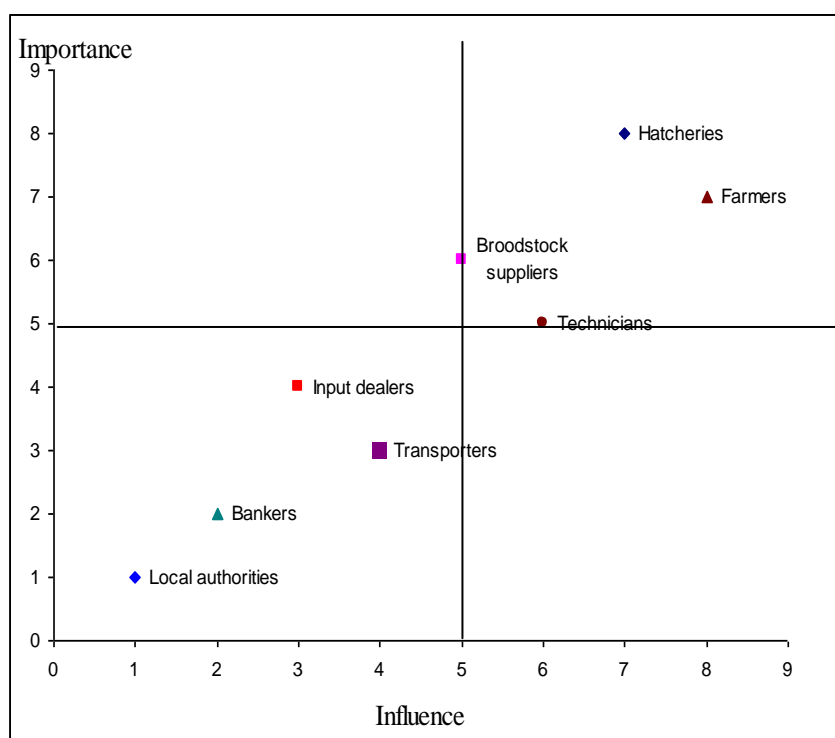


Figure 5.1-10 Importance and influence matrix of hatcheries and nurseries

SWOT analysis of hatcheries and nurseries

Plays as input suppliers to farmers, hatcheries and nurseries have many strengths and opportunities to develop. However, threats and weaknesses of the sectors are also remarks for them to consider their activities.

Table 5.1-5 SWOT analysis of hatcheries and nurseries

Strengths	Opportunities
<ul style="list-style-type: none"> - Having business skills - Availability of storages - Having financial capacity 	<ul style="list-style-type: none"> - Availability of markets - High demand of quality post larvae
Weaknesses	Threats
<ul style="list-style-type: none"> - Low technologies and bio-security - Poor performance of egg fecundity and egg hatching success - Small scale - Low competition 	<ul style="list-style-type: none"> - Low support from government - Seasoning of shrimp production - Depending on wild brood stocks - Infected with vital diseases - Reducing post larvae demand due to the given up of farmers

Main constraints of hatcheries and nurseries production in the MRD are low technologies, bio-security and investment as well as small scale. These have caused the problems of post larvae quality with the consequent of low competition. Besides, government does not have many significant supports to solve current problems in order to improve the sectors especially post larvae quality. The dependence of season, wild broodstocks created unstable inputs for hatcheries. Moreover, a large number of famers gave up their activities due to the loss in production has been reducing post larvae demand in the market. By contrast, demand of high post larvae quality is increasing because farmers wish to be sure of their inputs. Most of hatcheries have strong financial capacity before starting their activities with enough business skill. They also have enough land, storage to build tanks as technical requirements.

Combining internal and external advantages as well as disadvantages of hatcheries and nurseries, objective design can be presented in table 5.1-6. From the opportunities and threats, there are five objectives that nurseries and hatcheries need to improve their activities in order to increase their business efficiency. Most of objectives concern on technical problem such as increasing high quality post larvae, production season and pond broodstocks.

Results of harmful and helpful ranking to achieve the objectives show that hatcheries and nurseries need to have more the government's support in order to improve their current situation apart from their capacity.

Table 5.1-6 Objective design of hatcheries and nurseries

	Increase high quality post larvae	Increase production season	Increase pond brood stocks	Reducing vital diseases	Increase government's support
Having business skills	2	0	0	0	1
Availability of storages	3	2	2	3	0
Having financial capacity	4	3	3	2	0
Sub total	9	5	5	5	1
Low technologies and bio-security	7	4	4	4	0
Poor performance of egg fecundity and egg hatching success	6	2	3	1	0
Small scale	5	1	1	1	0
Low competition	1	0	0	0	0
Subtotal	19	7	8	6	1
Total	-10	-2	-3	-1	1

5.1.3.3 Farmers

Product flow at farmers

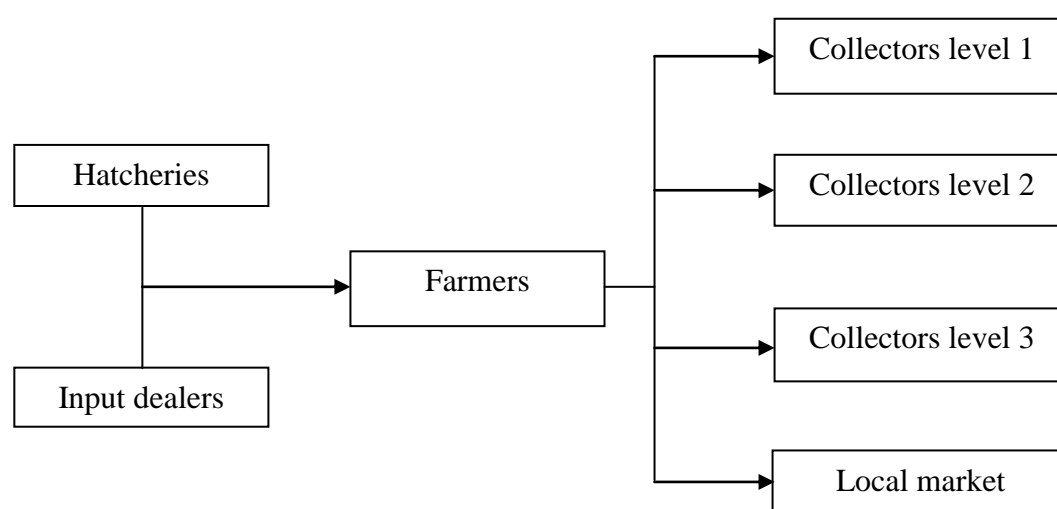


Figure 5.1-11 One step back and one step forward of farmers in the shrimp value chain

Farmers, a very important actor in the shrimp value chain in the MRD, play their role as raw material supplier to the shrimp market. Farmers buy inputs from input dealers and post larvae at hatcheries or nurseries for their shrimp cultivation. They sell their output to collectors level 1, 2, 3 or at local market (Figure 5.1-11).

Operation of farmers

Most of shrimp farmers in the MRD are small individual scale and converted from rice producers. They apply primarily traditional and some modified practices such as extensive, improved-extensive, semi-intensive, and intensive cultivation.

For shrimp intensive type, farmers start their cultivation by building a pond at the first crop. Lands about 0.5-1 hectares are dug into 1.2-1.6 m depth to make a pond with a gate for getting or releasing water. Some farmers have another smaller pond for nursing their post larvae before raising in the main pond. Utilised duration of the main pond depends on the demand of farmers. The pond preparation continues in the beginning of next season crop by dredging and putting lime into the bottom with pH determination. This activity need about 3-7 days included time for drying the pond bottom. After the process of drying pond bottom, pests, competitors and predators consisting of finfishes, crustaceans, molluscs, reptiles, amphibians, birds and mammals will be undersized to prevent from the harmful. The next step is to get water into the pond and management its quality to be ready for raising with a duration about 5-7 days.

Post larvae bought from hatcheries or nurseries are raised into the pond in the morning. Farmers continue their cultivation by feeding and managing water, shrimp health until harvest time. The cultivation duration is about 4-5.5 months depending on the climate and technical skill of farmers and market demand of shrimp size.

Market, labours public supporters for farmers' shrimp

Many shrimp workers are unremunerated family members while others are hired for temporary or seasonal work. Post larvae are seeded in the ponds, and feed may be administered to promote growth and weight gain. At the end of season, farmers contact with different collectors to sell their shrimps. Different collectors may give different prices of farmers' shrimps. However, bargaining is limited and farmers are more than price-takers though there is opportunity for negotiation.

Shrimp farmers in the MRD have low education, low financial capital, low technical skills, lack of market information, and low power of negotiation with other actors in the shrimp value chain. They are likely to stay at the weakest position in the shrimp value chain comparing to other actors.

Farmers are supported by provincial extension centers where the farmers can be helped with shrimp breeding techniques. However, the processing plants cannot assure the quality of the shrimp product from farmers as the shrimp quality is affected by many factors, apart from culture techniques, such as shrimp feed, veterinary and environmental hygiene that are not among the responsibilities of the extension centers. In some cases, farmers also have technical support from technicians of input supplied companies when buying their products.

More detail of famers production will be discussed in the section 5.2.

5.1.3.4 Collectors

Collectors are one of the shrimp value chain leaders apart from processing plants. As mentioned above, there are three levels of collectors and the biggest one is collectors at level 1. Collectors level 3 are usually located in the village, close to the ponds of farmers to buy their output in order to sell to collectors level 2 or 1 or local markets. Collectors level 2 are often located in the district. Most of their shrimp suppliers are living within a district. Their financial capital is much higher than collectors level 3. Collectors level 2 can buy shrimps from farmers and collectors level 3 to sell to collectors level 1 or to the markets. Collectors level 1 is the customers of collectors level 2, 3 and farmers. They are the main input suppliers of processing plants. Collectors level 1 normally can buy shrimp from different districts in the same province or even in different provinces.

After collected, shrimps bought by collectors level 3 are kept primitively and transported quickly to shrimp collectors levels 1 and 2 within one or two hours. Collectors level 1 give shrimp selling prices for farmers at the end of season basing on determined prices given by processing plants. They work very flexibly after getting a business license from DARD.

The collectors' activities are simple. They buy, preliminary process, store and transport shrimps to the processing plants. Seventy percent of shrimps will be preliminary processing at the collectors level 1 by water before transferring to the processing plants. Some will be removed heads before transferring basing on the freshness of shrimp. Shrimps only transport directly to processing plants from the farm when the collectors have an advance order (Figure 5.1-11).

Collectors sign an advancement contract with processing plants in term of supply volume at the beginning of the year. Shrimp sizes will be given later by processing plants after they signed a contract with importers. Shrimp prices are also determined by processing plants.

Due to the preliminary process, collectors level 1 usually have capital potentiality to buy equipment, transport means, facilities for preliminary processing and groups of root level collectors. Capital, maintenance techniques and means are main factors in the collectors' activities. The collectors' capital spent to buy shrimp materials is from three sources namely collectors themselves, loans, and the processing plants.

However, the collectors' capabilities themselves are limited. They lack of capital, quality awareness and equipment to inspect and maintain shrimp materials, and a low education level to understand and apply quality knowledge. Particularly, they do not seem to be high responsibility for the quality of their products in relation to the quality of the final products traded in the world market, and have used chemical and other substances to maintain shrimp materials before selling them to the processing plants (Vo, 2006).

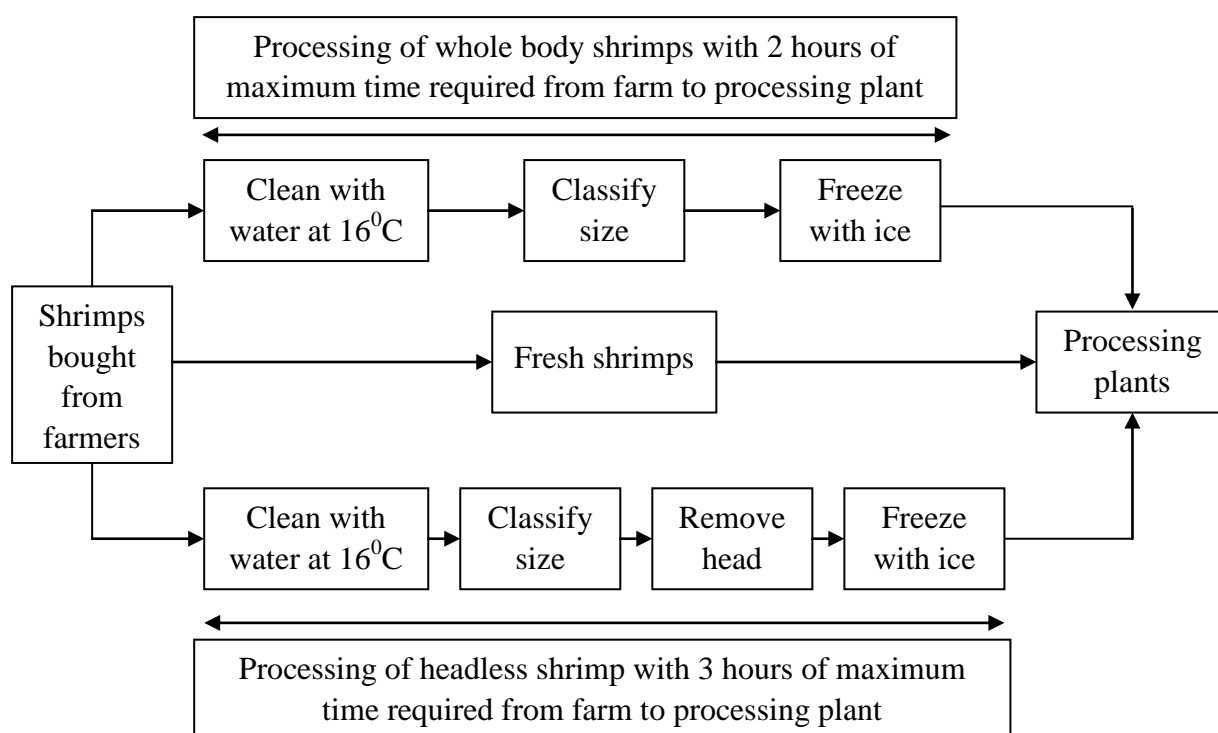


Figure 5.1-12 Shrimp process at collectors level 1

5.1.3.5 Processing plants

Processing plants, the leader of shrimp value chain in the MRD, are also the shrimp exporters. Main activities of processing plants is cleaning, preserving, and packaging shrimps to supply to the market after buying shrimp from farmers or collectors. Numerous processing plants also processed as cooked, prepared shrimps to add value into products to get higher profit.

Raw shrimps are mainly supplied by shrimp collectors levels 1 and 2. Shrimp are first passed the quality control unit and then classified, preliminary processed, re-processed, final processed, packed, exported or consumed domestically following an strict industrial processing process on the basis of sector standard, ISO and EU quality certificate. Depending on the business strategy of the company, the cultured raw shrimp proportion is more or less (generally 50%), the rest is from natural catching and extensive source (Tran, 2006). Recently, shrimp materials are also imported for process due to lack of domestic raw material shrimps.

Because of the small scale of farmers and their individual production form, processing plants prefer to buy their raw material from collectors than from farmers. They do not want to hire many workers for this activity and spend a lot of money for transaction cost to buy directly from individual farmers.

The processing plant is an establishment with several facilities or processing rooms, two-floor shrimp warehousing, laboratory, bathrooms, a first-aid room, and administrative offices. The entrance to the plant typically contains a pool with chlorinated water for disinfecting and the whole plant is kept wet with disinfectants to ensure a hygienic environment. Individuals inside the plant are required to use plastic boots to reduce contamination. The two-floor warehouses are kept sealed and the whole plant is built with smooth floors and walls to facilitate cleaning. Generators are used to compensate for any loss of power supply.

In general, the processing plants did not satisfy quality requirements of shrimp materials because, firstly, their plants are located far from sources of shrimp materials, and secondly, they are lacking the conditions to control quality of shrimp materials. The processing plants realized that quality of shrimp materials is a very important factor that affects to quality of final products. Therefore, the company's reputation in terms of business success and flexible price policies and quick payment are important elements that the processing plants have used to maintain the suppliers' loyalty. Besides, almost all processing plants in the MRD are in a cut-throat competition of buying shrimp materials (93.8%) with internal and external processing plants of the region. As a result, uncontrolled shrimp materials are still distributed in the MD popularly (Vo, 2006).

In order to control the shrimp quality, processing plants looked forward to set up a direct buying from farmers under a contract farming which mention the quality term. However, this model was broken due to several reasons including un-controlling shrimp raw material. Consequently, processing plants now tends to establish their own raw material zone to comply shrimp quality assurance.

Apart from above main primary actors, transporters play a critical role in the shrimp value chain in the MRD. Although most of the segments are interlinked through transportation, there are some specific activities that require substantial transportation expenditures. This actor relies on roads and boats to transport shrimp from farms and to collectors and then to exporters. About 16-20 percent of the total weight of shrimp is lost in the transfer from multiple intermediaries to the processing plants (Vo, 2006). Improving transportation infrastructure and handling processes could increase overall productivity in the sector.

5.1.4 Secondary actors of shrimp value chain in the MRD

5.1.4.1 Aquaculture Extension Services

Main secondary actors of shrimp value chain in the MRD consist credit suppliers, research institutions, DARD, aquaculture extension service, quality assurance offices and Vietnam Association of Seafood Exporters and Producers (VASEP) (Figure 5.1-12), of which, DARD, aquaculture extension service and quality assurance offices are representative of government at central, provincial, district and village levels.

These actors play an important role in encouraging and promoting quality assurance of shrimp from primary production to distribution. In primary production, the government has issued lots of policies and regulations related to shrimp safety and hygiene, environment protection, development of fisheries culture areas, used level of antibiotic, veterinary and other medicines for shrimp safety. However, the effectiveness of these policies and regulations have not been evaluated highly, because the implementation of the government programmes and policies have not been done synchronously by the local governments.

Presently, the role of aquaculture extension workers are very important in supporting the farmers with breeding techniques, breeding environment protection, even propagation of the government policies and decrees relating to fisheries safety and sustainable development, as well as instruction of implementation. But, demand for aquaculture extension workers in the MRD is now much more than its supply, both in terms of quantity and quality, and the number of experienced workers is very limited, so that the requirements of fisheries development cannot be effectively met.

5.1.4.2 Vietnam Association of Seafood Exporters and Producers

Apart from those actors, VASEP plays its role to enhance the competences and good practices in the shrimp sector. VASEP members include leading Vietnamese seafood producers and exporters and companies providing service to the seafood sector. The association was established on June 12th 1998 to coordinate and link enterprises operations, based on mutual supports to improve value, quality and competitive capacity of Vietnamese seafood, enhance creating raw material for seafood export, represent and protect legal interests of members.

VASEP members include enterprises of all economic forms, administrative agencies and authorities in seafood exporting and processing sectors of Vietnam, who accept VASEP rules and charter, voluntarily join the association and approved by executive committee. Most of VASEP members are prestige seafood producers and exporters, represent 80% of the total seafood exports of Vietnam; the others are service enterprises.

VASEP's mission

- Supporting members to improve capacity, quality and effectiveness in their business, create raw material sources, broaden the markets and strengthen competitiveness of Vietnam seafood products, contributing to development of Vietnam fisheries;
- Establish and develop linkage forms and coordinate members' activities based on voluntary and mutual interests; organize common events, facilitating mutual understanding and communication, aiming to create a goodwill relationship between members;
- Protect legal interests of the association and members; represent members to send government and state authorities the proposals and petitions on development of seafood processing and import-exporting;
- Develop members, infrastructure and expand operating scope of the association; establish and develop international relationship.

VASEP activities

With the main roles of supporting the development of Vietnam's seafood industry, VASEP has been performing the following activities:

- Enhance establishment and development of relationship between members;
- Establish linkage with farmers and fishermen;
- Establish committees of seafood sectors and enhance activities of each committee of seafood sectors.
- To be bridge between members with state authorities; timely tackle members' petitions, propagate and guide members to implement State policies.
- Establish and develop international relationship through activities such as hosting and taking part in industry seminars, projects, forums and dialogues in the world.
- Provide updated market information to member.
- Coordinate with relevant state agencies and partners to organize a variety of local seminars, conferences, events and other services for seafood enterprises and aquacultural farmers, seeking and discussing effective solutions to control quality, create raw material and promote production and export.
- Coordinate with partners to organize a variety of local seminars, conferences events at foreign exhibitions to introduce and broadcast Vietnam seafood images.

- Launch seafood trade promotion and export market expansion
- Annually organize Vietnam Fisheries International Exhibition (Vietfish)
- Provide training courses, supporting members to create and develop human resources
- Consult and give social critics in making and implementing state policies.
- Introduce partners to members

Most of VASEP members have reached industrial standards and represent over 80% of total of enterprises allowed to export to EU market.

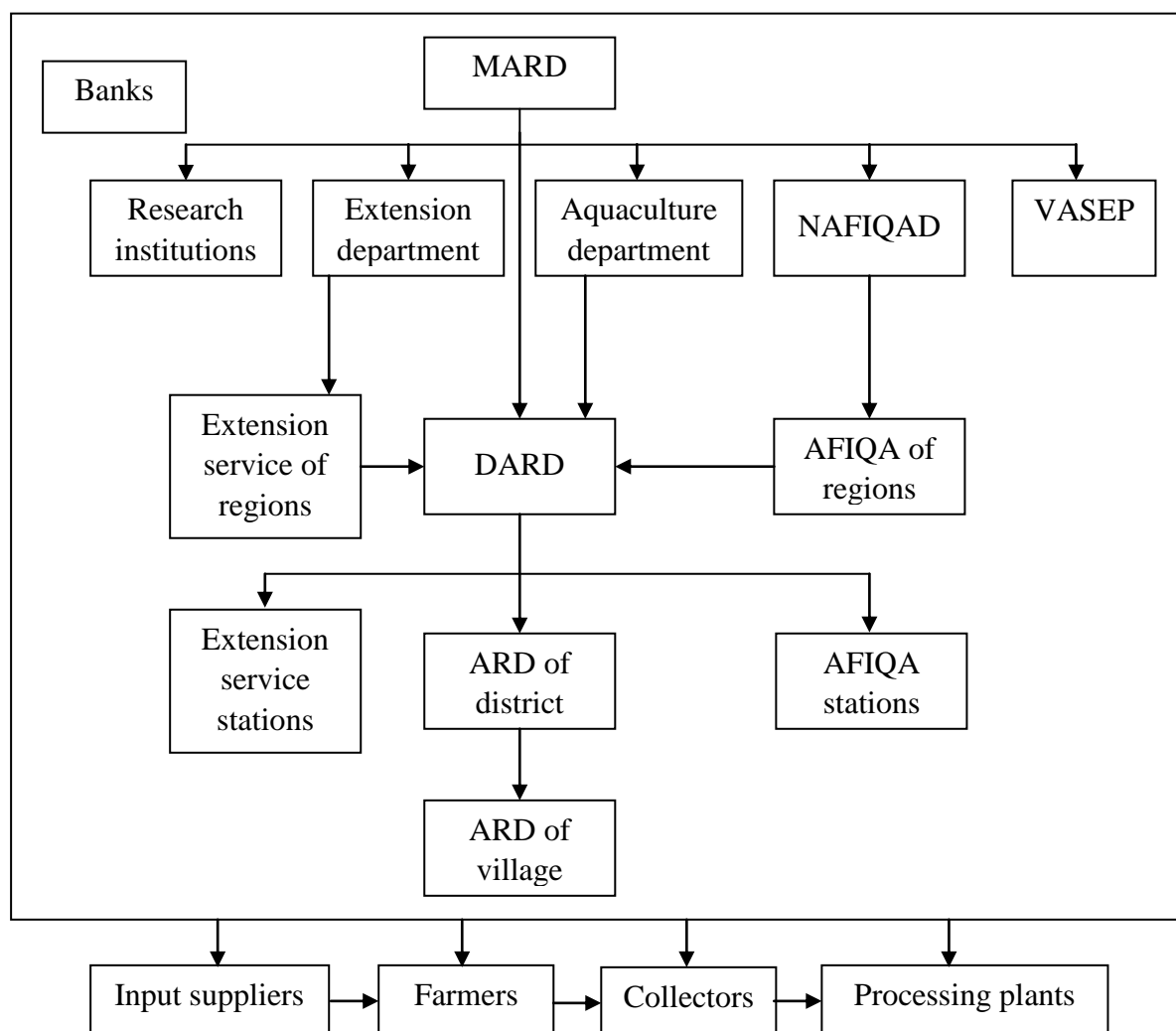


Figure 5.1-13 Secondary actors of shrimp value chain in the MRD

5.1.4.3 Department of Agriculture and Rural Development

Department of Agriculture and Rural Development (DARD) is a government institution which established by MARD to management, implement and monitor agriculture sector in the province. They are the representative of government in agriculture sectors at province level. DARD perform provincial management functions in the fields of agriculture, forestry, salt production, fishery, irrigation/water services and rural development, including provincial

management functions with regard to delivery of public service in accordance with legal documents.

In aquaculture sectors, DARD includes four sub-departments which have function namely Aquaculture Agency, Hatcheries and Seed Agency, Aquaculture Extension Services, and Aquaculture Inspection Services.

The main functions of DARD are as follows:

- Plans aquaculture production of the province;
- Implement and monitor central government policy at the province;
- Issues local policy to develop aquaculture in the province;
- Persuade and help aqua-farmers and the communities to improve their socioeconomic condition and quality of life by making improvement in their farming practices resulting in increased fish production and income;
- Monitor the quality of aquaculture products in the province.

DARD has played a significant role in the development of aquaculture.

5.1.4.4 National Agro-Forestry-Fisheries Quality Assurance Department

National Agro-Forestry-Fisheries Quality Assurance Department (NAFIQAD) is a government institution. It has main responsibility and roles on:

- Elaborate and submit to the minister drafts of laws, ordinances, strategies, legal documents in the framework of the annual programs and plans of the Ministry and other schemes, projects assigned by the Minister. Submit to the Minister drafts of decisions, directives, and other documents belong to the competence of the Minister;
- Propose and submit to the Minister strategy, long term master plan, five-year or annual plans, strategies for key zones and inter-provinces and other significant programs, projects and work belong to the responsibility assigned by the Minister;
- Issue specific documents and relevant professional guidance. Inform the plan of programs, titles, projects managed by the Ministry to related provinces and institutions after being approved by the Ministry regarding assigned fields;
- Submit to the Minister the developing strategy and master plan and instruct, guide, and supervise the implementation of approved legal documents, strategy, master plans, programs, projects, scheme, standards, technical regulations, procedures, practices, instruct and propagate, disseminate law and regulations regarding assigned fields;
- Manage quality and safety of fishery foodstuffs:
 - Synthesize and submit to the Ministry the national monitoring program on food safety of fishery products in stages of aquaculture, exploitation, harvest, preservation, dispatching, semi-processing, import for further processing, whole sale of fishery products; implement programs after being approved;
 - Submit to the Ministry the national standards, technical regulations on the quality and safety compliance of establishments, group of establishments, sites of aquaculture, exploitation and harvest, ports, markets, vessels, collectors, dispatchers, preservators, processing and wholesale establishment;
 - Synthesize and propagate national standards, technical regulations, and requirements of international organizations, regions and importing countries on quality and safety of fishery products.

- Check and certify or withdraw certification of health conditions concerning fishery foodstuff safety of aquaculture sites, fishing vessels, landing sites, markets, collectors, dispatchers, preservers, processing and wholesale establishments.
- Check and certify the food safety of imported fishery products for further processing and domestically produced fishery products before export or domestic circulation.
- Check and certify the animal health safety for imported, exported or transit fisheries according to Vietnam's law, requirements of international organizations or bilateral arrangements with importing countries.
- Examination and testing:
 - Synthesize and propagate Vietnam and international, region and importing countries' requirements on testing criteria, limit of detection, testing and examining methods in the assigned fields.
 - Guide and supervise the testing activities of quality and safety of fishery products.
 - Build-up national reference laboratories for fishery quality and safety criteria; recognize national and international reference laboratories for quality and safety criteria of fishery products.
 - Supervise the implementation of national standards and technical regulations on the quality assurance system for laboratories of fishery products.
- Build-up the network and evaluate, recognize the system of laboratories for agro-forestry-fishery products and salt testing; requirements and technical regulations on capacity, evaluation and recognition of accrediting bodies for quality and safety of agro-forestry-fishery products and salt; testing methods, reference testing methods, on-spot test kits. Taking part in the building up of the network of fishery disease examination.

5.1.5 Linkages among primary actors in the shrimp value chain

Within a value chain, trust and linkages are the inextricably linked. Normally, the trust created among actors in the value chain will be better if there is a linkage in an organisation. Organizations with linkages therefore might not need to have trust in order to do business if there are some enforcement mechanisms in place to ensure compliance with a given set of rules governing their relationship (M4P, 2006).

The investigation in the MRD shows that the linkage among actors in the shrimp value chain is not strong both in vertical and horizontal.

Both spot market and persistent network relations exist in the shrimp value chain in the MRD. Spot market relations appear between input dealers and farmers, and collectors and farmers. The main reasons of the existence of this linkage is the ensuring of farmers' input supply and output in order to have better prices. This linkage can change time by time basing on the volume of supplying products.

Linkages between farmers and input dealers as well as between farmers and collectors are not tight enough. The choice of farmers for their input suppliers bases on their financial capacity. Normally they keep the relation with input suppliers to buy material in case of financial limitation.

Linkage between farmers and collectors is the same with input dealers. Farmers keep contact with collectors in order to have better information. They can decide to sell their output to the collectors who give a better price. In this linkage, the farmers are free with their decision.

Linkage among collectors level 1, 2 and 3 remain as a network that created basing on the long relation over years. Normally, collectors level 1 establish their own network to buy shrimp in the market. They are the one who give information of prices and sizes to the collectors level 2 and 3. The linkage between collectors level 1 and 2 is quite strong when most of collectors level 2 sell their shrimp to the collectors level 1.

Linkage between collectors and processors in the shrimp value chain in the MRD seem strong when the reality shows that most of collectors sell their shrimp to the same processors in the different crop season. Collectors usually sign a contract with processors to supply shrimp with an expect volume at market price.

In brief, the linkages in the shrimp value chain are not through all actors. However, among backward and forward actors, the linkages is maintaining at the spot and persistent network relations. Most of linkage is unofficial when actors only have oral agreements. The official linkage appears in the relation between collectors and processors, the two having strongest power in the shrimp value chain. Data showed that the current linkage in the shrimp value chain in the MRD is not strong enough to apply the traceability system that requires by the importers. It therefore, the food safety standards seem not completely fulfilled.

5.2 EVOLUTION SHRIMP PRODUCTION EFFICIENCY AT FARM LEVEL

In order to understand better shrimp farmers' production and answer the question if farmers need to integrate vertically in the shrimp value chain, this section will have a detail analysis on stock density, yield, selling price, production cost, and cost structure.

5.2.1 Stock density evolution

One of the most critical inputs in shrimp cultivation affecting farmers shrimp production seems to be post larvae density, or in other word, stock density. In Mekong delta, the quantity of post larvae used in the pond is determined by farmer's production techniques and experience as well as by the expected selling price of harvested shrimp at the end of seasonal crop. Besides, superstitious number bringing luck for producers is also considered by farmers.

Table 5.2-1 presents the stock density cultivated by farmers from 2006 to 2009. The table shows that there is no clear stock density trend for this period. Stock density seems to slow down very slightly from 2006 to 2009. Only 13.7% of producers had a density lower or equal to 15 post larvae/m² in 2006, meanwhile this number had however, been increased to 34.3% in 2008 and lightly decreased to 17.9% in 2009.

Farmers having a stock density greater than 25 post larvae/m² sharply decreased it from 17.6% in 2006 to 13.3% in 2007 and more dramatically to 5.7% in 2008. However this group had increased again to 17.9% in 2009.

The table also shows that most farmers used more than 15 post larvae/m² and at least 25 post larvae/m² with a producers fluctuation set around 60%-75% during the period.

The minimal stock density appeared in 2008 and 2009 with 9 post larvae/m², meanwhile the maximal stock was found in 2007 with 35 post larvae/m² (Annex 1).

Table 5.2-1 Stock density frequency for the period of 2006-2009, first crop

Unit: post larvae/m² of water surface

Density (d)	2006		2007		2008		2009	
	Frequency	%	Frequency	%	Frequency	%	Frequency	%
D ≤15	7	13.7	5	11.1	12	34.3	5	17.9
15 < d ≤25	35	68.7	34	75.6	21	60.0	18	64.2
D > 25	9	17.6	6	13.3	2	5.7	5	17.9
Total	51	100	45	100	35	100	28	100

Results of one-way ANOVA analysis on stock density presented in Table 5.2-2 show that the difference in stock density in 2008 is statistically significant at alpha of 0.05. Stock density lightly reduced during the year 2006, 2007 and 2009 however this reduction is not significant.

Decrease of stock density from an average 22.27 post larvae/m² in 2006 to 18.71 post larvae/m² in 2008 is probably due to a change in farmers' technical methods, size preferences for shrimp growth and the awareness raised by extension workers about avoiding shrimp disease.

According to the procedure for intensive tiger shrimp culture (MOFI, 2001), stock density should turn around 25-40 post larvae/m² to reach an average yield of 3-4ton/ha. This figure has however decreased to 25-35 post larvae/m² in the Guide book for intensive shrimp culture issued by the Ministry of Fishery (VIE 97/030, 2004), and to 15-30 post larvae. This confirms that authorities and extension service advised farmers to reduce the stock density; and that farmers followed these advices.

Furthermore, although there is no data to illustrate it, the situation prevailing in the village shows that most farmers have been improving their technical skills after almost 10 years of experience in shrimp cultivation. Resulting from technical trainings and advises provided by several institutions, this improvement help farmers to achieve more successful production seasons. This includes a change in post larvae density to avoid shrimp disease and reduce input capital that often limits them.

Besides, one of the most important factors affecting farmer's decision-making on stock density is the market demand regarding shrimp size. From 2006 to 2008, it seems that farmers have been focusing their experiences on producing bigger shrimp to reach more profitable selling prices. For this purpose, shrimp farmers cultivated a thinner stock density in order to reach such bigger size at the end of the season within the same production duration. However, due to the 2008 economic crisis, shrimp prices fell down dramatically by 20 to 50%. In their attempt to minimize the losses, most farmers extended their production duration to wait for a price rise. This led to volume excess in big shrimps and a lack of small and medium shrimp in the market in 2008. Therefore, processing plants recommended to farmers to cultivate small and medium size products to meet market demands in 2009. As a result, farmers increased again their stock density to satisfy customer's preferences.

Table 5.2-2 Duncan's one-way ANOVA on stock density, first crops

Production year	N	Subset for alpha = 0.05	
		1	2
2008	35	18.71	
2009	28		21.36
2007	45		22.00
2006	51		22.27
Sig.		1.000	.471

Note: F value = 3.821, F probability = 0.011

T-test for two seasonal crops in 2006, 2008 and 2009 presented in Table 5.2-3 shows that there is no significant statistical stock density variation between two crops. This confirms that farmers usually use the same stock density for their production and that seasonal factor does not affect their decision making on stock density.

Table 5.2-3 Stock density variation between two crops

Year	Seasonal crop	Amount of household	Mean	Std
2006	First season	51	22.27	4.964
	Second season	13	21.00	4.243
2008	First season	35	18.71	5.727
	Second season	12	21.50	7.728
2009	First season	28	21.36	5.397
	Second season	12	21.50	7.728

5.2.2 Shrimp yield

Shrimp yield is an important efficiency parameter. Yield is affected by many factors such as farmers' technique, investment capacity, stock density and cultivation duration.

Shrimp yield slightly rose up in 2007 and lowered down in 2008. However, this difference is statistically insignificant at alpha of 0.05 (Table 5.2-4).

These results combined with the density decline in 2006 and 2008 are indeed testifying that shrimp yield has increased in this period. In 2008, farmers used less post larvae and reached the same yield as last season. Once again, farmers' experience affects significantly shrimp yield.

A lower density seems to bring to farmers a higher efficiency by reaching a higher yield thanks to larger shrimp growth at harvest time. Therefore, this trend can help farmers achieving their expectations from adopting a new technique.

Table 5.2-4 Shrimp yield evolution between 2006 and 2009, first crop

Year of production	N	Subset for alpha = 0.05
		1
2006	51	3005.3
2007	45	3500.6
2008	35	2967.2
2009	28	3637.9
Sig.		0.347

Note: F value = 0.556, F probability = 0.645

However, since the financial crisis in 2008, extension workers forecasted an increasing demand in the international market for small shrimps. Therefore, farmers cultivated higher stock density again in 2009 that resulted in a yield increase from 2,967.2 kg/ha (2008) to 3,637.9 kg/ha in 2009.

This confirms one more time that market demand is an important factor that affects farmers' decision regarding shrimp production.

Table 5.2-5 Shrimp yield frequency from 2006 to 2009, first crop

Yield (kg/ha)	2006		2007		2008		2009	
	N	%	N	%	N	%	N	%
$Y \leq 1500$	8	15.69	10	22.22	9	25.71	0	0
$1500 < Y \leq 2500$	12	23.53	4	8.89	5	14.29	5	17.86
$2500 < Y \leq 3500$	18	35.29	16	35.56	6	17.14	9	32.14
$3500 < Y \leq 4500$	6	11.76	7	15.56	9	25.71	8	28.57
$4500 < Y$	7	13.73	8	17.78	6	17.14	6	21.43
Total	51	100	45	100	35	100	28	100

One can observe that the trend in shrimp yield distribution is increasing from 2006 to 2009 (Table 5.2-5). In 2006, 15.69% of households had a yield inferior to 1500 tonnes/ha. It increased in 2007 and 2008 and decreased again in 2009 to 0%. Most farmers explained that during the period of 2007-2008, an epidemic disease affected the region and most of their production has been lost.

On the contrary, the ratio of farmers whose yield was bigger than 3,500 kg/ha also increased from 25.49% in 2006 to 50.0% in 2009. This confirms that farmers' skills are very important for their production activity. Beside the losses faced by some households, a large percentage of farmers in the region were successful with their production due to better knowledge and experience.

5.2.3 Shrimp selling price evolution

As everyone who starts his business, farmers cultivate shrimp expecting a successful season in terms of yield, production, selling price at farm gate and more than anything, profit. Out of these, based on the selling prices, farmers can usually plan their maintenance, extension or decrease his next cultivated season.

Selling prices at farm gate mainly depends on shrimp size. Shrimp are graded according to their count per weight. Whole shrimps (head on tail on- HOSO) are graded in units per kilogram. In principle, bigger size provides better price save except when the market experience a crisis such as presented above.

Table 5.2-6 Shrimp selling price evolution in the period 2006-2009

Unit: 1000 VND

Season according to production year	N	P
Second season 2008	14	63.86 ^a
First season 2008	33	76.11 ^{ab}
First season 2007	44	85.64 ^{bc}
First season 2009	28	91.90 ^{cd}
First season 2006	49	92.55 ^{cd}
Second season 2006	12	103.33 ^d
Second season 2009	12	103.75 ^d

F value = 7.011, F probability = 0.000

Selling prices at farm gate were presented in Table 5.2-6.

Selling prices went downward during this period, dropping from VND 92,550/kg in 2006 to VND 63,860/kg in 2008. Selling prices evolution in 2006 and 2008 is statistically significant at alpha of 0.05. Selling price analysis in 2009 showed that the peak was reached at VND103,330 in both first and second seasons.

Shrimp selling price trend for the period of 2006 to 2009 in Vinh My village is presented Figure 5.2-1. The selling price decrease started in the first season of 2007 and reached his lowest point in 2008 in the first season.

Following information collected through the surveys, shrimp market went through a price crisis in 2008. At that time, the world financial crisis strongly impacted Vietnam economy, and shrimp sector was not out of the reel. Most of processing plants export contracts was down prices to importers. Consequently, shrimp selling price at farm gate got down.

However, the data shows that the best selling price in 2006 was VND135,000/kg, meanwhile they were VND120,000/kg in 2007 and VND140,000/kg in 2008. The results show an overall decrease trend in shrimp selling price though not obvious in all observations. According to farmers, some farms still got better prices for their products by selling shrimps alive. These prices sometimes are twice the usual one. Therefore, diversification of shrimp product outputs might be more business effectiveness.

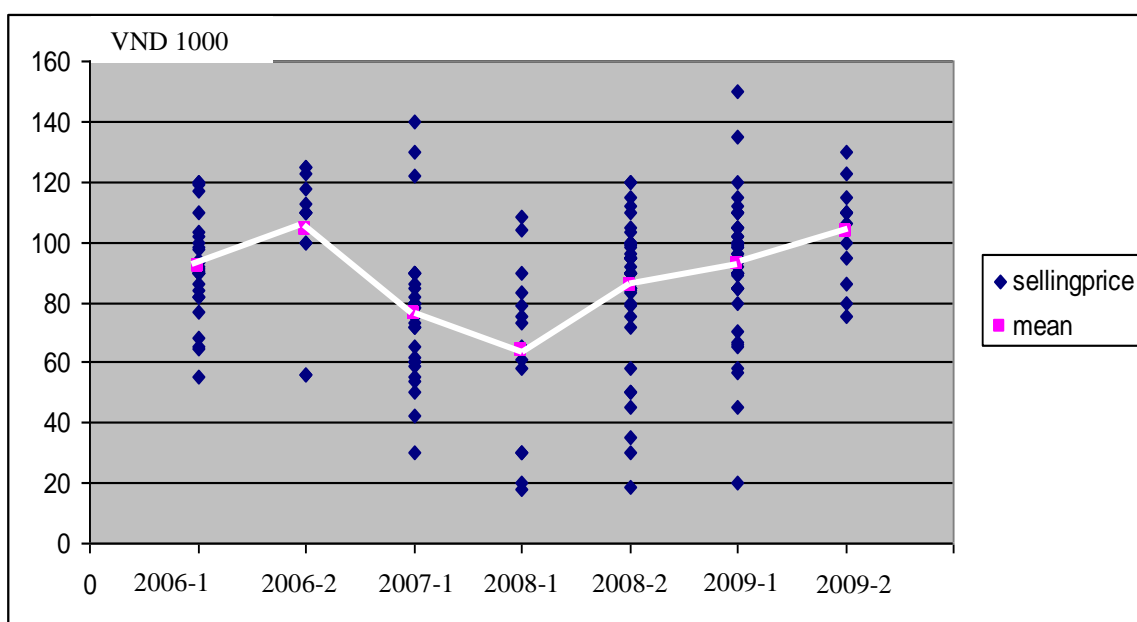


Figure 5.2-1 Shrimp selling price from 2006 to 2009

In addition, some farmers having good relationship with processing plants could sell their output directly to them and get higher prices than what collectors would pay. They could indeed get around VND 4,000-5,000 more per output shrimp kg. However, only few farmers had the relationship network to proceed this way.

5.2.4 Production cost structure

Three main production costs of shrimp cultivation include variable cost, fixed cost and hired labour cost. Of which, survey result showed that variable cost counts a largest part in shrimp production cost with about 90.28%. Fixed cost presents only 8.66% of total cost and hired labour cost is 1.06% (Figure 5.2-2).

This result indicates that variable cost is main very important part of shrimp production at farm level. Farmers will need a large amount of financial capital to cultivate shrimp, especially in the last months of production season when shrimps consume a large volume of feedstuff.

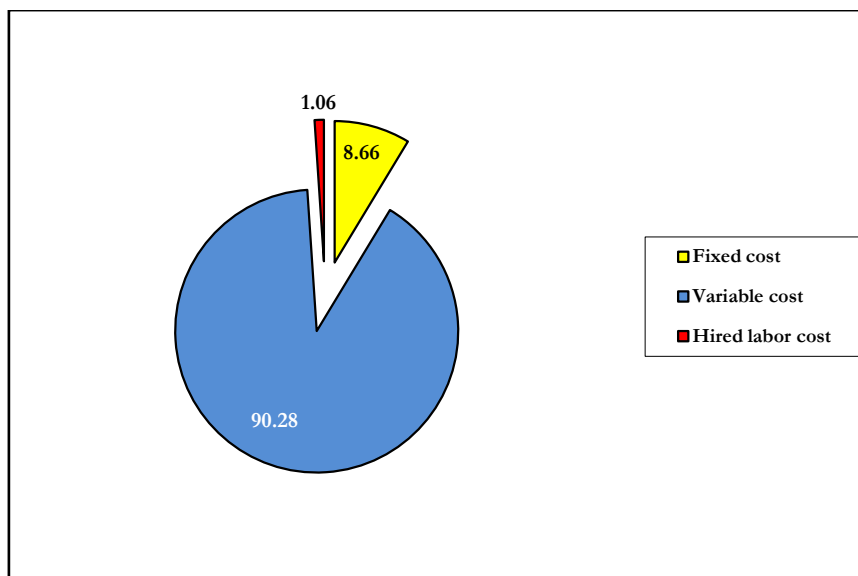


Figure 5.2-2 Production cost structure in shrimp production

5.2.5 Fixed cost structure in shrimp production

As mention in above, fixed cost only counts a small part of total shrimp production cost. However, compare to other sector like rice, fruits, and other crops, it is still much higher. Fixed cost in shrimp cultivation involves cost for pond preparation, water treatment, depreciation and others.

Cost of water treatment consists of chemical cost for killing crustaceans and algae in the pond, creating colour of the pond to have a suitable environment for shrimp. This cost presents a largest part in fixed with more than 44%, followed by pond preparation and depreciation (Table 5.2-7).

Table 5.2-7 Fixed cost structure in shrimp production

	2008		2009	
	Mil VND	%	Mil VND	%
Fixed cost	20.829	100	24.674	100
Pond preparation	7.041	33.80	9.538	33.80
Water treatment	9.276	44.53	8.278	44.53
Other fixed costs	0.010	0.05	0.828	0.05
Depreciation	4.502	21.61	6.029	21.61

Depreciation cost was calculated basing on the family payment for excavation costs, machinery, and short and long term equipment specifically used for the shrimp production which was about 4.5mil VND in 2008 and more than 6mil VND in 2009.

Though the survey did not conduct in 2006 and 2007, according to farmers' statements, fixed cost is likely not changing in shrimp production in the research area.

5.2.6 Evolution of shrimp variable costs during the period 2006-2009, first season

Cultivated shrimp variable costs encompass post larvae, feedstuff, chemical, labour and others such as fuel and electricity. These costs represent the biggest share of shrimp production cost reported by farmers and other researches (Viet, 2006).

Table 5.2-8 Categories of cultivated shrimp variable cost during the period 2006-2009, first season

Unit: Mil. VND

	2006		2007		2008		2009	
	Value	%	Value	%	Value	%	Value	%
Variable cost	172.03	100	175.27	100	197.57	100	257.15	100
Post larvae	11.806	6.86	10.195	5.82	9.732	4.93	11.375	4.42
Feedstuff	112.44	65.36	118.83	67.80	128.17	64.87	179.85	69.94
Chemicals	33.248	19.33	34.873	19.90	43.314	21.92	47.059	18.30
Fuel	12.413	7.22	9.311	5.31	12.71	6.43	16.747	6.51
Electricity	1.569	0.91	1.411	0.81	0.894	0.45	1.184	0.46
Others	0.551	0.32	0.649	0.37	2.747	1.39	0.932	0.36

Table 5.2-8 shows that total variable cost for cultivated shrimp was set around VND150 million /ha in 2006, VND155 million in 2007, and VND175.8 million in 2008. Of these, feed cost still accounts for the biggest share with more than 64% for the four production years while chemical cost stands second at around 23%.

This trend could indicate that no change was brought by farmers to their cultivation technique in terms of feedstuff and chemical use. They keep on believing that “the more they put in the pond, the safer they are”.

Through the interviews, many farmers explained that their strategy to avoid diseases is to use several kinds of vitamins to feed shrimp. In parallels, they also try to feed shrimp by the best feedstuff that suit to their capacity as they experienced from several years of cultivation. Those having high production capital will buy better feedstuff as well as chemical for their shrimp.

Table 5.2-8 also shows that post larvae, feedstuff, and chemical still account for the biggest share of shrimp cultivation variable cost. From 2006 to 2008, these costs represented about 97% of the total variable costs while costs of labour, electricity, fuel and interest charge were just less than 3%. Therefore, the only way to reduce farmers’ production cost for shrimp cultivation is to reduce what represents the second largest share, namely chemical cost of as technical experts’ advices.

Looking at the ANOVA results in Tables 5.2-9, 5.2-10, 5.2-11, 5.2-12 and 5.2-13, we found that post larvae and chemical costs seem to be slightly increasing from 2006 to 2008. The post larvae cost increase is about VND1 million/ha while chemical cost is about VND7 million/ha. The biggest increase in variable cost is found in feedstuff with about VND21 million /ha in

2008. This change leads total variable cost to rise up by about VND25 million /ha compared to 2006 and by VND20 million /ha compared to 2007. However, the differences in 2006 and 2007 are statistically insignificant at alpha of 0.05 except for hired labour cost in 2008.

Table 5.2-9 Evolution of post larvae cost, first season

Unit: Mil. VND/ha

Year of production	N	Subset for alpha = 0.05 1
2006	48	9.3
2007	41	10.3
2008	33	10.6
Sig.		0.366

Table 5.2-10 Evolution of feed cost

Unit: Mil. VND/ha

Year of production	N	Subset for alpha = 0.05 1
2006	48	101.9
2007	41	107.2
2008	33	121.3
Sig.		0.153

Table 5.2-11 Evolution of chemical cost

Unit: Mil. VND/ha

Year of production	N	Subset for alpha = 0.05 1
2006	48	33.4
2007	41	34.7
2008	33	41.0
Sig.		0.320

Table 5.2-12 Evolution of hired labor cost

Unit: Mil. VND/ha

Year of production	N	Subset for alpha = 0.05	
		1	2
2006	48	0.1	
2007	41		2.6
2008	33		2.8
Sig.		1.000	0.650

Table 5.2-13 Evolution of variable cost

Unit: Mil. VND/ha

Year of production	N	Subset for alpha = 0.05	
		1	
2006	48	150.3	
2007	41	155.3	
2008	33	175.8	
Sig.		0.169	

Hired labour cost decrease is statistically significant at alpha of 0.05, from 2.8 mil/ha in 2006, and from 2.6 mil/ha in 2007 to 0.1 mil/ha in 2008. This decrease is appropriate with increased trend of using family labours of farmers. After few years of experience in production activities, and in order to reduce labour cost, farmers involved in shrimp cultivation could do much work in the farm by themselves instead of hiring labours. On the other hand, it is very difficult to find out labours for shrimp cultivation during the production season because this is not full year working time. Therefore, farmers prefer to cut down the amount of hired labours on farm.

The statistical insignificance of the variable cost differences seems to imply that technical trainings provided by many institutions on reducing chemical inputs in the ponds are not very effective. The only change observed in chemical use is the components substitution.

Combining the selling prices decrease and the absence of change in variable cost, it appears that farmers shrimp cultivation efficiency is lower in 2008 than in 2006. This means that shrimp production at farm level had not developed during this period. This is also the main reason for many farmers to give up their cultivation activities in 2009. Therefore, strong support is needed from primary and secondary actors in the chain to improve farmers' production efficiency.

5.2.7 Unit cost in shrimp production

Due to the lack of information of fixed cost in 2006 and 2007, the unit cost of shrimp production only focused in the year of 2008 and 2009 (Table 5.2-14).

Table 5.2-14 Unit cost in shrimp production

	2008	2009
Variable cost (Mil. VND/ha)	197.6	257.2
Fixed cost (Mil. VND/ha)	20.8	24.7
Hired labor cost (Mil. VND/ha)	0.5	3.0
Unit cost (Thous. VND/kg)	75.6	68.1

In 2008, the unit cost of shrimp production was VND75.6 thousand/kg. This number is VND 68.1 thousand/kg in 2009.

Though total cost 2009 was higher than the year 2008, the higher in shrimp yield contributed a good point to decrease the unit cost of shrimp.

5.2.8 Return in shrimp production

Table 5.2-15 presents the return in shrimp production of farmers in the year 2008 and 2009. Gross return of shrimp in 2008 was VND222.0 thousand per hectare and VND351.5 thousand per hectare in 2009.

Return above family labour in 2009 is much more than it is in 2008, VND66.6 mil per hectare and VND3.9 mil per hectare, respectively. This could give an idea that family labour is very important in shrimp cultivation. Making up family labour could save a large amount of production cost for the household.

Due to the increase in shrimp yield as well as a significant higher selling price in 2009, the net return of shrimp production in 2009 was about VND45.7 mil per hectare. By contrast, low price and low yield in 2008 with a high inflation made net return of family get a deficit at VND15.7 mil per hectare.

Table 5.2-15 Return in shrimp production

Unit: Mil. VND/ha

	2008	2009
Gross return	222.0	351.5
Total cost	218.4	281.8
Hired labor cost	0.5	3.0
Return to family labor	3.9	66.6
Family labor cost	19.6	20.9
Net return	-15.693	45.7

Table 5.2-15 also shows that there is a very large interval of lost and gain in shrimp cultivation. If farmers have a successful season they will have a very large amount of money

in comparing with other sectors like crops and livestock. This explains why still having many farmers who still try to continue with this sector after few fail seasons. However, it is also evident that, the loss in shrimp cultivation is also very high so that there are many farmers being in debt in the MRD.

5.3 CONCLUSIONS

Shrimp value chain in the MRD consists both primary and secondary actors. Primary actors include input dealers, hatcheries, farmers, collector level 1, collector level 2, collector level 3 and processing plants, of which collectors level 1 and processing plants are the leaders of the shrimp value chain in the MRD.

Farmers cultivate shrimp in small scale and individually. They are lack of market information, technical skills, as well as financial capital for their production. They are therefore likely to stay at the lowest position in the shrimp value chain and having low negotiating power. First forward customers of farmers are collectors. Their second forward customers are processing plants though this form was finished some years ago.

Processing plants determine shrimp prices in the market basing on the contracting price signed with their forward customers and market prices. Sometimes, they have to increase raw material buying price if the price in the external market is high and there is not enough shrimp in the market for their operation. Further they set up requirements of shrimp quality and size in the market to assure customers' demands. However, they are not successful due to the limitations of financial capital, knowledge, and awareness.

Concerning shrimp cultivation evolution, the following conclusions can be drawn:

- There is a trend in technique applied by farmers, especially in terms of stock density. However this trend remains strongly affected by market demand;
- Shrimp yield maintenance for some period of time during which density decreases could signify that farmers achieved higher production efficiency;
- Cultivated shrimp yield is unstable, which confirms that shrimp cultivation is a very sensitive sector that requires high production skills from farmers;
- Shrimp production costs increased in nominal price during the period, however it decreased in constant price;
- Return from cultivated shrimp is not high, which confirms that farmers' strategy regarding shrimp cultivation is based on an "income maximization" instead of a "profit maximization".

CHAPTER 6. FARMER VERTICAL INTEGRATION IN THE SHRIMP VALUE CHAIN

Nowadays, vertical integration under contract farming form creating linkages in agricultural production is frequently referred to agriculture and rural development. Vertical integration presented in linkages have been learned, in the context, the collaboration between input suppliers, processing plants and farmers through contract farming in view to increase production efficiency. Vertical integration under contract farming form presenting as linkages in production and consumption of agricultural products are an indispensable tendency not only in Vietnam, but also in many other developing countries. In fact, however, it indicates that linkages only exist for a short time and have a low efficiency due to contractual failings come from both sides of contractors.

This chapter will try to analyse the vertical integration under the form of contract farming creating linkages among actors in shrimp production in the Mekong River Delta based on two case studies in of Ben Tre and Soc Trang provinces. Furthermore, it will also identify key institution and policies factors influencing actors' behaviours for integrating in the shrimp value chain.

6.1 DEMAND FOR VERTICAL INTEGRATION IN THE SHRIMP PRODUCTION SECTOR IN THE REGION

As mentioned in previous part (2.1.4), vertical integration is very important because of a reduction in transaction cost, opportunities for innovation and product differentiation, gains derived from market information, risk reduction and market power increase. In shrimp production it also increases demand for capital during the production process and create high competition in shrimp product markets. Furthermore, most of actors in shrimp value chain found that shrimp production in Vietnam is unsustainable sector due to low prices, unstable prices, high competition and lack of information in market prices. They expect to improve their production activities to get more benefit by increasing possibility to access to capital, new technologies and having supports from suitable aquaculture policies.

Due to the fluctuation prices of shrimp products, shrimp production is changed year by year because of an increase or decrease of number of producers. If the prices are high, more farmers will join in the sector and more farmers will increase their production area. By contrast, if the selling prices are low, some will give up their production and mover to other aquaculture products such as fishes, crabs. This creates a vicious circle of shrimp product prices (Figure 6.1-1). The more farmers cultivate shrimp, the more production supply in the market. At some cases, there is an excess supply lead to a broken bottom of selling prices and consequently, there is a lack of shrimp raw material supply next crop season due to a reduction of production. As a result, processing plants do not have stable shrimp raw material suppliers to deal with their business.

Shrimp processing plants usually sign contracts with importers to supply an amount of products at a given time. These contracts often give a plan of amount of raw materials that the processors need to buy shrimps from farmers for their processing activities. However, shrimp production is not stable so that processors are not sure if they have enough inputs at the time they sign a contract. They therefore might reduce buying prices if there is an excess supply

from farmers. They also might have to increase buying prices to collect shrimp if inputs are not enough in the market. Thus, both actors are not in stable position to play the game.

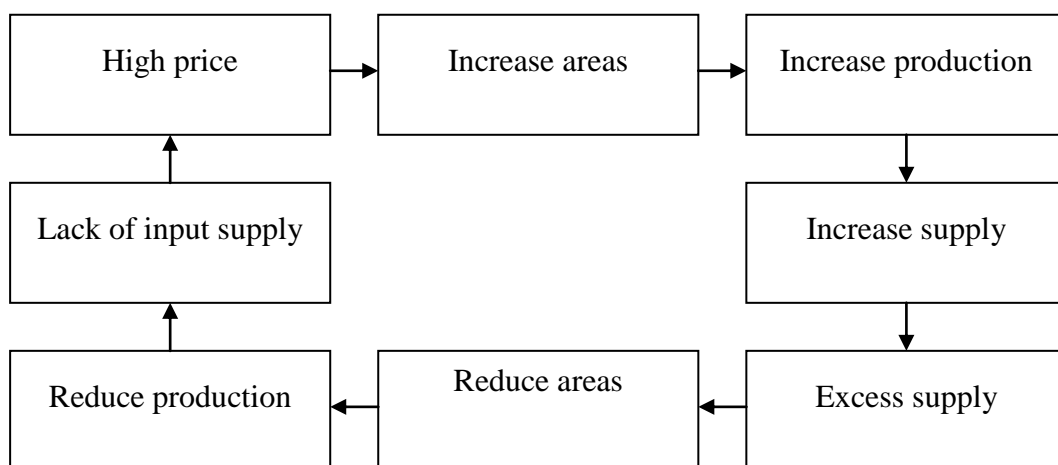


Figure 6.1-1 Vicious circle of shrimp product prices in the Mekong River Delta

In addition, shrimp are classified as a very sensitive product in global market. Utilization of chemical, feedstuff in shrimp cultivation is very important issues that get attention of Vietnam government, producers, processing plants, exporters, and importers, especially since the requirements of product quality in term of food safety have been strict in the world. In order to have good product quality to supply to the market and satisfy consumer references with a sustainable production, all actors namely, hatcheries, farmers, collectors, processing plants in the shrimp value chain need to have strong linkages through a contract. This linkage will help exporters comply all food safety regulations to satisfy the requirements of importers such as traceability, hazard analysis and critical control points (HACCP). Exporters will not fulfil all procedures if there is no information contributed from other actors.

Above mentions highlight that there is a mutual dependence between shrimp cultivation farmers and processing plants to supply shrimp products in the market. These two actors need to work together to develop a sustainable value chain in shrimp sector. Vertical integration therefore can offer a change for their improvement and creating a win-win situation as well as trust for both sides.

6.2 MAPPING THE KEY INSTITUTION AND POLICY FACTORS INFLUENCE ACTORS' BEHAVIOURS

Institutions and policies are humanly devised constraints that structure human interaction. They guide human making decisions and activities by creating a plan of actions to reach a certain objectives (Vermeulen, 2008). Understanding the roles of institutions and policies is needed to develop a dynamic value chain in the market where people interact with each other to make ordered social life possible.

Vietnam, a developing country having dynamic agro-food markets, exists numerous systems of institutions with many different interlinks among actors in the value chain such as culture, business practices, government laws, regulations and different organisations. These institution

systems have been developed strongly both in formal and informal forms, especially since country had made efforts in recent years to integrate into world economy by joining in and becoming member of many economic groups such as the Association of Southeast Asian countries (ASEAN), ASEAN Free Trade Area (AFTA), World Trade Organization (WTO).

From this integration, national economic and income capital of people have been accelerated rapidly in the country due to the growth up of international trade. However, joining in the global market and being as a player to import, export goods, Vietnam has to accept and comply all the rules of the game such as international standards, food safety law as well as trade barrier systems established by international organisations, or import/export countries even though it is unfair sometimes. Vietnam has therefore still faced to many difficulties, especially with control export products' quality in term of strict international policies and regulations which influence strongly actors' behaviour. High value export products are still dealing too many trade and non-trade barriers that have either positive or negative impacts to actors in the value chain.

Shrimps, a strategy export product of Vietnam with value reached more than US\$1 billion yearly, cannot be out of the game. All actors of the shrimp value chain have to improve their production, trading activities to satisfy all requirement of market. Production improvement of the sector therefore is very important. It will have numerous positive impacts on livelihood of local people living in the coastal area of the Mekong River Delta of Vietnam, especially in the region where there has been a change of farming structure, from rice to shrimp production (Tran, 2006).

In order to manage the trade flow of shrimp in the world market, a pile of policies and institutions have been issued at the national and international levels such as tenure laws, marketing regulations, foreign direct investment policies, import/export tariffs, sales tax, private and public food quality standards (Figure 6.2-1), of which the European (EU) Food Safety Law, Best Practice Management (BPM), Global GAP (replaced Europe GAP), Sanitary and Phytosanitary Measures (SPS), and Hazard Analysis and Critical Control Points (HACCP) are the most important policies and regulations at the international level that influence actors' behaviour to integrate in the shrimp value chain.

At the national level, there are hug of policies that have strong affect the development of the chain implied as follows:

- 1) Decision No. 224/1999/QĐ-TTg of the Prime Minister dated 8 December 1999 approving the plan of aquaculture development in the period of 1999 to 2010 with the main objective to ensure food security for people and supply fishery material for export;
- 2) Resolution No. 09/2000/NQ-CP dated 15 June 2000 of the Prime Minister of allowing farmers to convert low productive rice fields, uncultivated areas, and salt pans into ponds for aquaculture;
- 3) Decision No. No-80/2002/QĐ-TTg dated 24 June 2002 of the Prime Minister encouraging actors to integrate in the value chain through contract farming.
- 4) Fishery law stipulate aquaculture activities issued by Vietnamese National Assembly dated 26 November 2003;
- 5) Decision No. 10/2006/QĐ-TTg dated 11 January 2006 of the Prime Minister approving the master plan for fishery development to the year 2010 and the vision 2020 with the main objectives to reach two million tons of aquaculture in 2010, of which 0.98 million tons from fresh water aquaculture and 1.02 million tons of marine and brackish water.
- 6) Decisions of the Prime Minister dated 2007 and Agricultural Minister on reorganizing the Ministry of Agriculture and Rural Development as well as its affiliated body.

Of which, decision No-80/2002/QĐ-TTg dated 24 June 2002 of the Prime Minister encouraging actors to integrate in the value chain through contract farming has the most affect farmers and processing plants to integrate in the shrimp value chain under vertical integration form.

Apart from public policies, culture, trust and credit issues are also institution aspects that affect actors’ behaviour to join in the linkage of vertical integration. This factor not only influence shrimp farmers but also input suppliers, collectors and processing plants to make a decision if integrating or not. Institutions make trust possible in business. Trust is either created informally among shrimp actors or is established through a formalized contract.

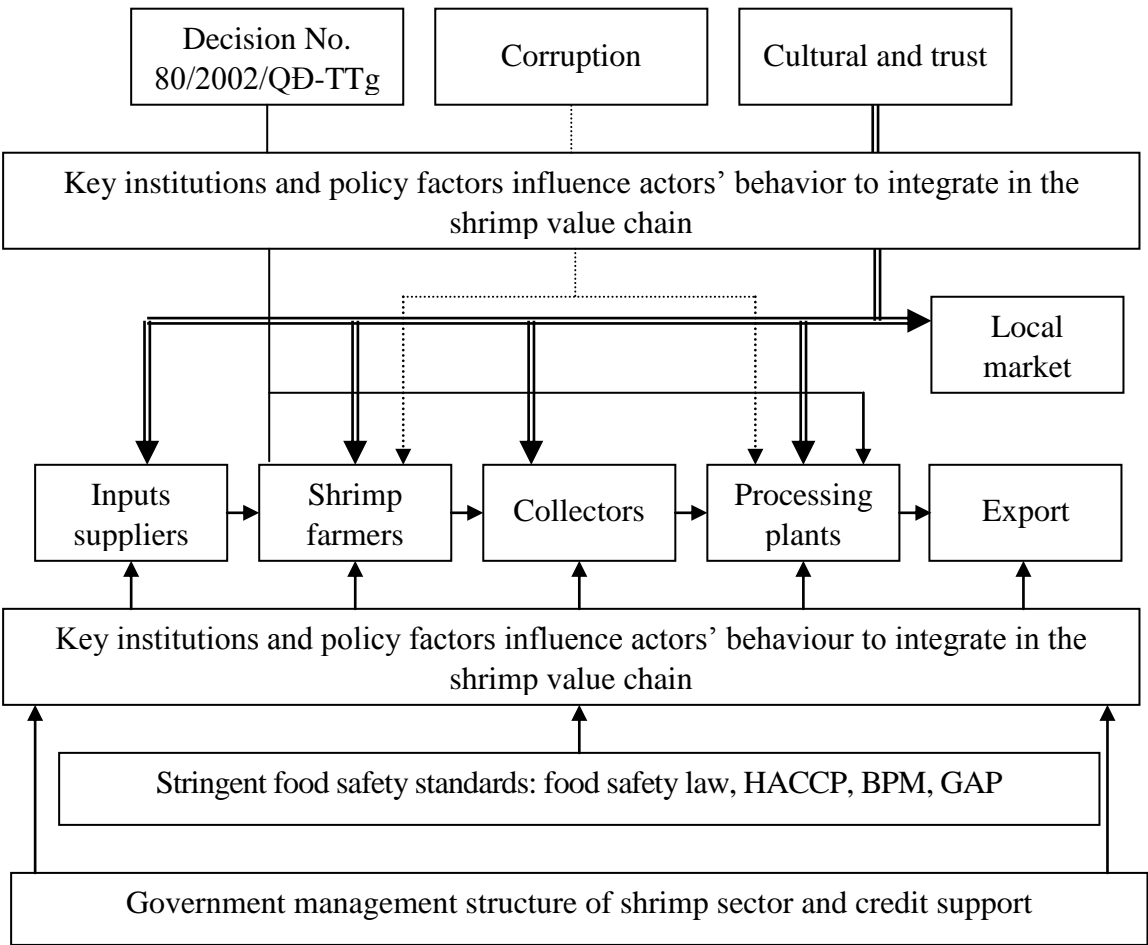


Figure 6.2-1 Mapping the key institution and policy factors influence actors’ behaviour

6.2.1 Food safety standards

Over the last decades, international trade has faced a significant evolution in terms of demand for commodities. Traditional commodities have seen their share declining, while high-value food products export increased consistently. Consumer tastes, technological progress, transport improvement together with higher and less volatile prices all encouraged south countries to supply international markets with more and more fresh and processed products. Nowadays, high-value food products represent about half of the total value of agri-food

export from developing country export commodities, while they accounted only for 31% in the early 1980s (Jaffee and Jabbar, 2005).

This economic opportunity appeared in the context of multilateral trade negotiations. The WTO is indeed tackling all forms of protection or agricultural production support measures. Among others, it led to lift up tariff barriers, which benefited to some southern exporters. These countries definitely display a comparative advantage for high value food products as they reach much cheaper production costs than the West.

Take into account consumers preferences on food safety and quality, many global NGOs, international trade union federations and international and regional organisation such as FAO, WHO, WTO established standard systems to control food export from other countries. These systems have been harmonized of national standards under the International Organisation for Standardization (ISO) to facilitate trade and reduce potential market failures (Nadvi, 2004).

Concerning shrimp value chain in Vietnam, many processing plants have followed some international standards i.e. HACCP, while farmers have been encouraged to apply BPM and GAP in their production activities, to ensure product quality. Nevertheless, they cannot control quality of raw shrimp. Therefore, it is necessary to call upon a better control system for shrimp production, where small farmers, collectors and input suppliers play very important roles.

Since 2000s, the EU market has applied a Rapid Alert System (RAS) to warn on the basis of results from testing agro-products including Vietnamese shrimp products export to this market. The warning information refers to infection levels of antibiotics, microbiology, and other contaminants that might occur in the entire shrimp value chain due to low quality raw materials, low hygiene and safety levels during cultivation, maintenance, transportation, processing, storage, and distribution. Japanese and United State markets also published an information system for warning on the same information as RAS. According to VASEP and NAFIQAD, because of many tested samples did not meet the standards for export in terms of safety, hygiene and quality, Japanese government decided to take test for all shrimp products export to this market in 2007. This same problem had occurred in 2002 for the shrimp export to Netherlands. At that time, many shrimp containers were destroyed or sent back.

In order to reduce the risk of export shrimp quality, Vietnam government has introduced many national and international food safety systems to control the problems such as the European Food Safety Law, Dutch HACCP, British Retail Consortium (BRC), BPM, GAP. In general, most of these international standards applied in shrimp production in Vietnam have the common issues to control production activities preventing the risk in order to have shrimp safety, of which HACCP is a very important approach that has been recognized by many countries as a system which identifies, evaluates, and controls hazards for food safety (McDonough, 2002).

HACCP was found in 1950s and developed rapidly in 1993 to reduce the risk transfer from food in process. The use of this approach in food industry became mandatory in the EC for all value chains since 1993 in EU countries (EC Council Directive No 93/43/EEC on the hygiene of foodstuffs, now repealed by Regulation No 852/2004 of the European Parliament and of the Council on the hygiene of foodstuffs). Nowadays, HACCP certificate has been becoming a vital document in the international trade. Since January 2006, firms from the third countries must have this certificate to export their products to EU market apart from other requirements (EU regulation No 852/2004).

HACCP is considered as a tool to control any area or point in the shrimp production system that might contribute to the hazardous situation, whether being contaminants, pathogenic

micro-organisms, physical objects, chemicals, raw materials, a process, directions for consumer's use at all stage of production, storage, distribution, and the preparation of food. These control points can be used as inescapable measures to provide hygienic standards and health safety. Leaper (1997) stated that the basic objectives of the HACCP are to assure the production of safe food products by prevention instead of by quality inspection. It was basically designed for an application in all parts of agri-food production from growing, harvesting, processing, manufacturing, distribution, and merchandising to preparing food for consumption (NACMCF, 1998).

HACCP has been applied in shrimp production in Vietnam in the early 2000s by importers from EU, US and Japan markets. These importers set up their quality control systems at the processing plants where they have plans to buy shrimp products. They come to processing plants yearly with inspectors from their country or neutral one to check and grant a certificate to certify that the plants have satisfy quality control system.

Due to the restriction of quality knowledge, techniques, infrastructure, and technological and equipment investment, HACCP have just implemented un-fully at part of processing plants in shrimp value chain while input suppliers, collectors, and farmers are still out of the game. Nevertheless, not all of processing plants in Vietnam has applied HACCP system for quality control to guarantee their product quality.

Vo (2006) indicated the greatest constraints on the implementation of HACCP and prerequisite programs in Vietnam are the limitations of managerial knowledge and technological investment within the processing plants. These limitations are especially big challenges for processing plants in making effort to ensure a shrimp safety value chain where they play an important role in terms of instruction in maintenance techniques and quality control awareness.

Moreover, processing plant managers are the only ones who are trained the principles of quality management while most of processing activities are implemented by their workers. It is obvious that the application of HACCP is ineffective and inefficient in the plant if this problem has not been solved. Consequently, shrimp final products do not meet quality standards as expected.

Furthermore, teaching HACCP system for workers and applying them correctly is not an easy issue due to 1) the high investment costs of new technology; 2) the lack of knowledge and methods to identify and describe the various hazards, lack of critical control points, lack of documents for observation, and not keeping records as well as inadequate starting procedures for eliminating the hazards; 3) the lack of standard conditions in the manufacturing process in order to meet the requirements of GMP, Sanitation Standard Operations Procedure (SSOP), and BRC; and 4) lack of quality knowledge about Safe Quality Food (SQF), ISO, and HACCP at the level of the middle managers and workers, as well as the lack of methods and principles to apply HACCP quality control standards, resulting in hazard infection in final shrimp products (Vo, 2006).

According to traceability requirements for HACCP system, shrimp processing plants need to have enough information records of their input materials at farmer, collector, and transporter levels. One step forward and one step back for record information is necessary to comply with procedures. They cannot apply the system if there are no contributions from other actors in shrimp value chain. They have to either create their own raw material zone or establish a linkage with shrimp farmers through official contracts. Theoretically, creating own shrimp raw material zone will increase production cost of the plants due to less specialized. These contracts are therefore an effective choice for plants to meet there expectation in terms of applying HACCP, especially traceability procedures, a critical document of HACCP. The

contracts will assure specify requirements for shrimp material quality including attractive interests on supporting of capital, equipment, training and price information.

However, in fact, most of shrimp farmers were conversed from rice to shrimp production in the coastal area of the Mekong River Delta at the end of the 1990s. Many rice producers joined in shrimp production without sufficient technical skill, necessary infrastructure and other knowledge related to issues as environmental protection, market information, international standards and quality, safety regulations (Tran, 2006). These insufficiencies would dramatically weaken the application of HACCP at the farm level in the shrimp value chain.

Above mentioned can give conclusion that both shrimp farmers and processing plants in the MRD have mutual dependence to develop their business in term of shrimp quality management. They need to work together as partners to provide products to satisfy customers' demand. Contract farming in this case can offer both sides an opportunity with a win-win solution.

6.2.2 Policy number 80/2002/QĐ-TTg

Agricultural and aquaculture productions are highly hazardous activities because of diseases, natural calamities, environmental constraints and price fluctuation. In Vietnam, particularly in the Mekong River Delta, these risks are making agricultural and aquaculture productions unstable. Specially, under the small and spontaneous production condition, the risk is the implicit cause which can be raised at any time in the production process. In addition, Vietnam now has integrated more in the global market which creates many opportunities and challenges for those who are involved in international trade.

Coping with above challenges, on 24 June 2002, Vietnamese Prime Minister issued Decision No. 80/2002/QĐ-TTg to promote the contract farming. This decision encourages enterprises in all economic sectors to conduct farming contracts with farmers, scientists and bankers in order to establish a stable link between farm commodity and processing and marketing activities to enable sustainable farm development. In Vietnam, this policy is known as linkage of “4 nha”, that indicates a cooperation of two primary and two secondary actors namely enterprises, farmers, government and scientists.

The farming contracts should be signed every year at the beginning of a farming season, or a production cycle which mention the contract conditions in form of credit advancement, technical assistance, and farm produce purchasing; input provision and farm produce purchasing; or direct farm produce purchasing and production cooperation. The farming contracts should cover all the required items and be prepared on forms issued which accord to the national law. During the implementation of the contract if either of the two parties violates any signed item they must get a fine and bare full responsibility for any loss that may result.

To run this policy, many development programs focusing on linkages of “4-Nha” among enterprises-farmers-scientists-government have been initiated by governmental authorities through various incentive policies and supports including policy for land use, investment, credits, technical advances and technology transfer, and market and trade promotion.

The decision indicates roles of each actor in the contract as follows:

Farmers have the responsibility to supply raw material that undertaken in the contract.

Enterprises have the responsibility to purchase farmers' products that undertaken in the contract.

Scientists have the responsibility to support technique, and technical transfer to farmers and enterprises.

Government plays a role as an arbitration and conciliation when having conflicts between farmers and enterprises who are the contractors of farming contract.

In shrimp production, this policy is very important to reduce the risk of price often crashed due to bumper crop harvesting seasons. It will help shrimp farmers to decide whether to continue their production activities or not. At the processing plant side, it will give enough information of their raw material suppliers.

Difference from commercial transaction form of prompt delivery where price presents supply-demand relation, price indicated in farming contract will be included risk and benefit share and decision right of farmers and processing plant in their business. For farmers, this price need to be high enough to satisfy their benefits basing on their production cost estimated at the beginning of production season. It also should cover the cost of lost in their production due to bad weather or shrimp disease. For processing plants, the contracting price should cover the risk share of their processing and product distribution to the market. However, according to the decision No. 80/2002/QĐ-TTg, farming contract will have a floor price. Farmers and processing plants will sign a contract in which selling price will be minimized at floor price to cover production cost of farmers. At this price, whatever happens in the market, processing plants have to pay an amount that might be higher or lower than market prices. This will appear a problem of breaking contract coming from both sides. If the market price is higher than floor price, farmers will be willing to break contract to sell their shrimp to other collectors in the market. By contrast, if market price is lower than floor price, processing plant does not want to deal with contract while they can purchase cheaper shrimp from others. This happens very easily due to no conducting legal framework in Vietnam to compel contractors respect the contract.

In order to prevent above problem, both farmers and processing plant will agree a market-floor price. With this shrimp price mechanism, participating farmers are allowed to sell their shrimp to processing plant when the raw shrimp price on the market is lower than “floor price”, and could sell to other parties when price offered is higher. Consequently, the meaning of contract farming is insignificant because market price is hardly equal to floor price.

6.2.3 Government structure and organisations

Government structure and its organisation will be responsible for issuing the policy, regulations and services along the chain. Organization is the process of positioning people and other resources in such a way that they can work together in order to accomplish a goal. Organizing involves creating a division of labour for tasks to be performed and then coordinating the results to achieve the common purpose (Schermerhorn, 1999). A common purpose will achieve when a collection of people work together in an organization. When people had decided on their objective, they will take actions and they have certain ways to accomplish these objectives.

Organizing involves creating conditions for the decision-making processes in terms of (Schermerhorn, 1999):

- People: including attracting, developing and maintaining a quality workforce;
- Information systems: involving ensuring that information gets at the right time and in the right place, and providing resources for collecting, organizing and distributing data to support the decision-making process;

- Organizational structure: including defining tasks, responsibilities and authorities, rules and procedures.

Understanding the government structure as well as its organisations will help to understand the factors that influence actors' behaviour to play their role in the value chain. A successful organisation will respond to economic conditions and actors' behaviours.

In shrimp sector, three ministries have responsibility to monitor namely the Ministry of Agriculture and Rural Development (MARD), the Ministry of Industry and Trade (MOIT), and the Ministry of Natural Resources and Environment (MONRE). These three institutions play an important role in legislation and policy process. MARD will be in charge of issue and monitor specific policies, laws, regulation and actions of government agencies in agriculture while MONRE and MOIT will be in charge of environment and trade respectively. However, it often has an overlap in their functions to administer due to complicated organisational structure of the ministries and unclear mandates of each one (Figure 6.2-2). For instance, to manage quality of shrimp in term of sustainable environment at farm level, two ministries will have to take roles in issuing law and regulations namely MARD and MONRE. To implement different staff in different ministry will monitor their policies without considering to the others as a unique. Consequently, an overlap would appear.

Taking into account the quality management, shrimp value chain characteristics during primary production are different from other products like fish, rice, fruits and animals in the MRD. On the one hand, shrimp is cultured in very large quantities throughout the whole region with a risk of spreading disease throughout the entire stock of shrimp. On the other hand, the low skills of farmers who converted from rice to shrimp production, a limitation of financial capital and the equipment to control the hazards are difficult to impart farmers' knowledge of quality control. It therefore need to have a combination of management by the State, local authorities, processors, collectors, hatcheries, input dealers and farmers to improve the primary product quality.

The government needs plan large hatcheries and farms for effective management and control objectives through issuing policies and regulations in terms of shrimp seed quality control, environmental and fishery hygiene and safety. Up to now, the Vietnamese government has issued a huge of policies and has established national programs to protect the environment including the control of pesticide residues, veterinary drugs and other antibiotics to ensure the safety of seafood products. Nevertheless, these policies have not completely implemented by all actors in the shrimp value chain due to the limitation of staff's capacity and responsibility, the weakness of monitoring, and the awareness of actors. It often has a mismatch between policy objectives and policy implementation. As a result, the effectiveness of the implementation is at a low level and hazard infection still exists (Vo, 2002).

Regarding decentralized management, again the government is represented by the Ministry of Agriculture and Rural Development, which has issued fishery safety and quality control regulations directly to the local governments, farmers, processing plants. Besides, the authority and the liability of The National Agro-Forestry-Fishery Assurance Department (NAFIQAD-known as NAFIQAVED in the past) are nowadays enhanced in terms of the issuing, the management, and inspecting of fishery quality control policies and regulations. NAFIQAD is responsible for implementing quality management throughout the local government, provincial agricultural departments, processing plants and other relevant institutions and organizations – both in primary production and at other stages of the chain (Figure 6.2-3).

Considering the current concern about the safety and quality of shrimp export to global market, the Vietnamese government has shaping strategy and policy to control the sector in

order to satisfy the beliefs of consumer and their buying behaviour. One of its strategies is to establish a strong and efficient organisational structure to support and control the shrimp value chain including government agencies responsible for food safety issues and many different businesses interacting along the shrimp value chain. These agencies have main functions to develop public policies and to establish rules and regulations to meet consumer demands as well as legal requirements.

In reality, there is little coordination between these institutions and organizations. Therefore, local governments need to train primary producers and to establish regulatory control programs to ensure food safety and wholesomeness at the primary production level. To do this effectively, provincial extension centers and departments of agriculture and aquaculture are important support channels for training, for the implementation of instructions, and for inspection. A linkage is needed between the observation and inspection by technicians and extension staff, and the farmer's implementation of quality control measures. This means that the processing plants should join forces with local departments to assist farmers in producing good quality shrimp materials. Vertical integration is one solution to solve these problems.

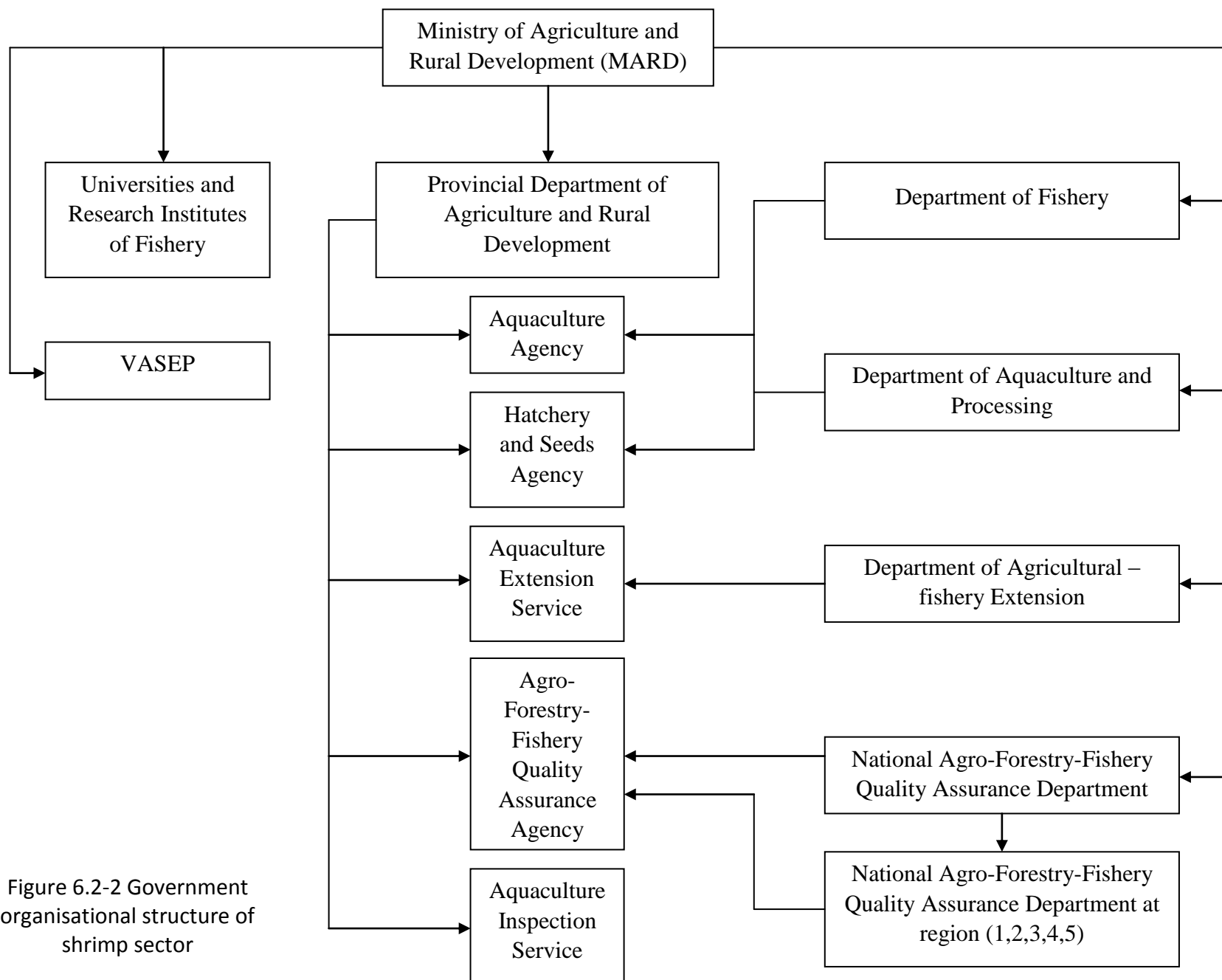


Figure 6.2-2 Government organisational structure of shrimp sector

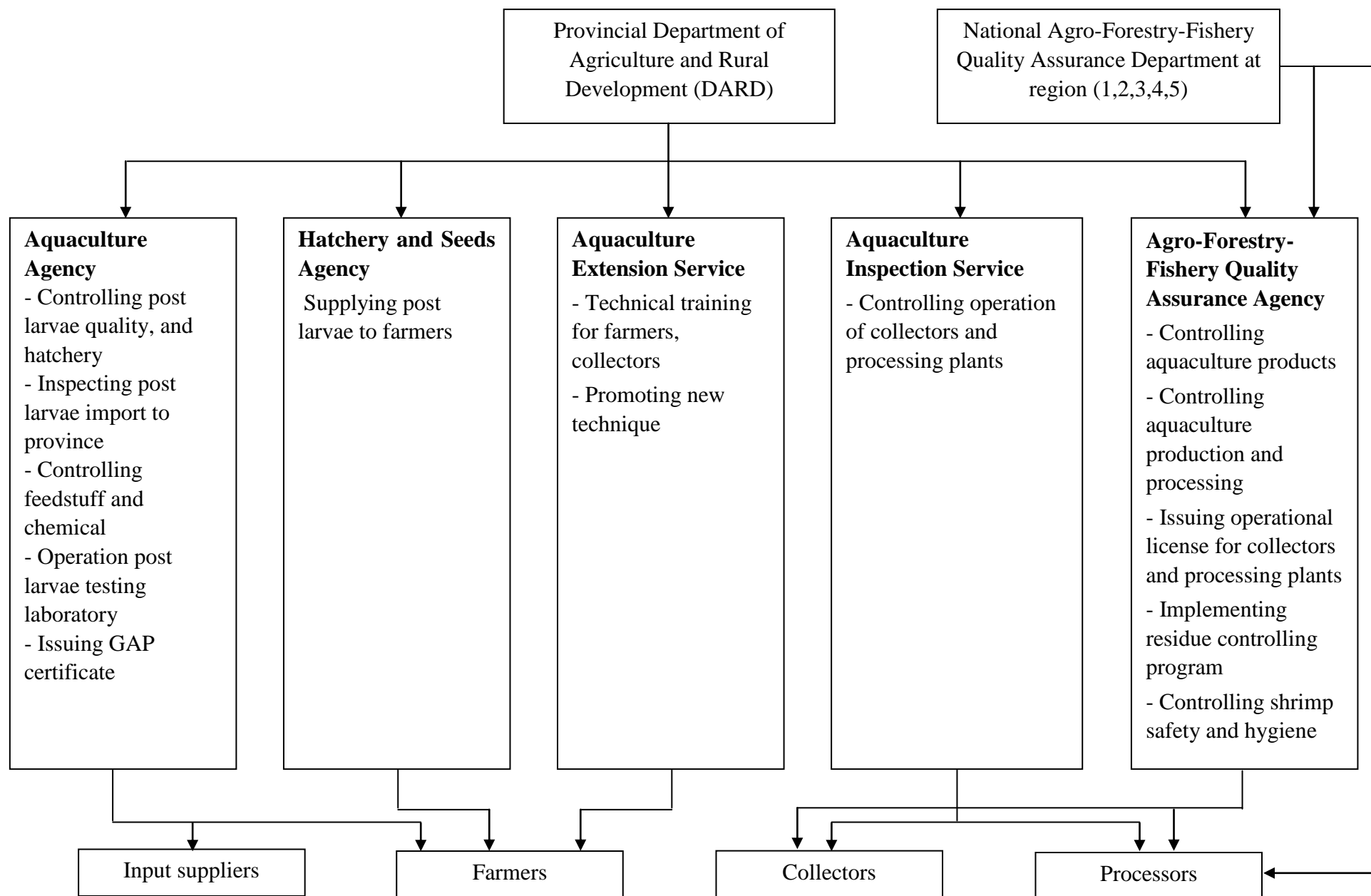


Figure 6.2-3 Government organisational structure of shrimp sector at provincial level

6.2.4 Cultural, trust and corruption issues

Apart from the important role of the formal institution under public and private policies, culture and trust are considered as an informal institution that establishes and maintains vertical integration in shrimp value chain in Vietnam. To create trust, fair and clear financial accounting of partners in the shrimp value chain and the responsible behaviour of these partners are considered as the most importance. These are also the critical points to make vertical integration successful in shrimp value chain (Raymon, 2004).

As a cultural characteristic, Vietnamese are known as individualists in their own behaviour. They do not have strong community spirits to consider what they should do to contribute to public like Japanese have showed. Vietnamese emphasized that one Vietnamese can win one Japanese in some aspects but three Vietnamese working together will be surely beaten by three Japanese in the same field. This explains why there are many failures of cooperatives in agri-food chain, and shrimp value chain is not an exception. Most of shrimp farmers hesitate to get involved in dependency relationships. They do not trust other actors like collectors, processing plants to establish a linkage because of the fear of being cheated by others.

From the discussion with farmers in the surveys, most of them confirmed that they did not want to sell their shrimp directly to processing plants due to three main reasons:

Firstly, the timely payment when selling shrimp to processing plant is always later than it does with collectors due to the requirement of tax management at the plants. The payment will be processed at more or less one week after purchasing shrimp when tax procedure is completed. However, as the fact that, most of farmers do not have enough financial capital to deal with their shrimp cultivation. They often have to borrow money officially or unofficially with a high or low interest to buy inputs. They therefore expect to receive money back from selling shrimp as soon as possible to return their loans. As a result, it might indicate a problem with current behaviour of farmers and processing plants as partners in the linkage under vertical integration form, especially in field of fair accounting and delay of payment.

Secondly, there is no transparency in full measure of shrimp selling at the processing plants. Farmers often think that processing plant staff always gives a short weigh of their shrimp. They consequently will be lost some amount. The behaviour of farmers in this case will limit the chance to integrate in the shrimp value chain form both sides.

Finally, farmers feel that processing plant staff usually does not appraise exactly quality of their shrimps. Staff often provides a difficult measurement to devalue shrimp quality in order to pay less.

Besides the trust and individualist, one other limitation of Vietnamese characteristics is selfishness in term of sharing information and knowledge. They often hide information of quality, technique, quantity of products, know-how, and market information instead of exchanging with others. Therefore much more information available at both ends of shrimp product value chain never flows to the end (Raymond, 2004). This issue is considered as an insufficient factor hamper shrimp actors integrating in the value chain.

As a developing country, corruption is still a problem for the economic development in Vietnam. In the shrimp business, corruption can undertake at many parts of the value chain such as processing plants by their staff, especially logisticians who are in charge of buying inputs. They often collude with collectors to get a premium by exceeding the shrimp quality while devaluing shrimp of farmers. This amount will be shared for other colloques in the plants to maintain the situation. Collectors in Bac Lieu province confirmed that they usually have to pay logisticians an amount of money to have their easiness in classifying shrimp

quality. This situation will cut down the opportunities of farmers to sell their products directly to processing plants and therefore, vertical integration of farmers is hard to process.

6.2.5 Credit supports

Financial capital is a very important factor influencing shrimp actors behaviours to integrate in the shrimp value chain. Tran (2006) concluded that more than 90% of shrimp farmers in Bac Lieu had to borrow money for their cultivation. There is an existence of formal and informal credit resources for shrimp farmers to access to financial service.

Informal sources of credit can be funded by moneylenders, input suppliers, processors or relative. This kind of credit often had high interest rates and unfavorable conditions attached to loans such as pre-fixed low prices on shrimps (Tietze, 2004) though it is considered as the most easily accessible for farmers except moneylenders.

Official credit is mainly available through government sponsored directed credit programmes under the management of Agriculture and Rural Development Bank (AgriBank), Development Assistance Fund (DAF), The Bank for Investment and Development of Vietnam (BIDV). In order to access to this service, farmers need to use their lands as a mortgage to deposit at the bank to borrow money. Many cases in MDR showed that, farmers might be lost their land property if they got fails in their cultivation for several seasons. Furthermore, complicate lending procedures and certificate requirements, collaborated requirements, inflexible loan repayment schedules and short repayment intervals and periods, lack of knowledge about lending procedures, and lack of opportunity to take a second loan are main difficulties that prevent farmers and other actors to obtain official credit (Tietze, 2004).

Regarding above difficulties, the government has issued several support programmes for rapidly expanding shrimp processing and export industry in Vietnam that more or less help shrimp actors to access better to financial service. However, most of these programmes only support actors who have collaboration with each other, especially processing plants and farmers, for example the support program under decision No-80/2002/QĐ-TTg. This created a chance for farmers and processing plants making a linkage to satisfy the requirements to get more financial capital for their business.

6.3 LEVEL OF VERTICAL INTEGRATION IN THE SHRIMP SECTOR

Despite of many support policies issued by government and the need of products quality management from the international requirements in shrimp sector, up to now only two cases of vertical integration were conducted in the MRD. The first case was implemented in Ben Tre province for the shrimp small farmers and the second one is the contract farming between large production scale and a processor in Soc Trang province. The rest shrimp farmers have not involved in any additional action of vertical integration under contract farming.

Shrimp farmers involved in the contract farming were medium and large production scale with minimum production area about 2-3ha. Small scale shrimp production could not become a partner in the vertical integration under contract farming form.

Though only two cases of contract farming were found in the MRD, it proved that these two observations could provide enough information and reasons to understand the advantage and disadvantage of vertical integration under contract farming form in the MRD.

Key strengths and weaknesses of vertical integration under contract farming from in shrimp value chain in the MRD:

Strengths

- Conditions for emphasizing specialization was created;
- Predictable quantity and quality of produce for processing plants;
- Farmers and processing plants can predict the shrimp prices;
- Input and output of farmers, processors were ensured, including prices for shrimp actors;
- Reduce costs of shrimp products;
- New technology was easier to apply;
- Farmers benefit from assistance in technology, capital, inputs;
- Skill transfer and farmers can improve their production skills;
- Farmers can access to better market information, agricultural credit, financial incentives;
- Farmers confident in expanding production and increasing outputs;
- Reduce risk in shrimp production;

Weaknesses

- Lack of legally binding environment;
- Price fluctuations have impacts on shrimp farmers' decision;
- Breaking of contracts is common when the market fluctuates;
- Farmers, especially small ones, are in a weak position and excluded from the vertical integration.
- An elaborate way of exploiting small farmers
- Contracts are often signed in terms of the floor prices, which is much lower than the market prices;
- Increased transaction cost of processors due to an increasing of number of contactors.
- Weak contract enforcement;
- Good contracts are complex, while farmers are not good at negotiating a contract;
- No negotiation space or arbitration body is usually available to settle actors' dispute;
- Social and environment issues were not considered.

6.3.1 Contract farming in Ben Tre province

Among the six provinces in the MRD (out of Ca Mau, Bac Lieu, Soc Trang, Tra Vinh and Kien Giang) Ben Tre province that is undergoing an intenseshrimp production development, participated in the government program by taking the initiative to establish shrimp production linkage that undertaken by farmers through a contract farming in 2006. In this process, DARD of Ben Tre province played a key role (Figure 6.3-1). With a mobilizing campaign based on voluntary participation, it created in three districts (Binh Dai , Ba Tri and Thanh Phu) a model of nine shrimp farmer groups who was having production area of two to three hectares. These shrimp farmer groups established a linkage with Ben Tre Forestry-Aquaculture Import Export Company (FAQUIMEX) through annual farming contracts established at the beginning of shrimp crop in 2006. The provincial Agriculture and Rural Development Bank (AgriBank)

participated in the linkage chain by providing capital loans through FAQUIMEX. The farming contract was promoted by local government to implement the policy No. 80/2002/QĐ-TTg.

The main operating vertical integration under contract farming procedures were as follows:

- Farmers
 - o Annual contract signing at floor price, selling product to FAQUIMEX at market price;
 - o Free inputs purchase;
 - o After 75 days of shrimp production, farmers were supplied with funds provided that FAQUIMEX technicians assessed they complied with technical requirements;
 - o Farmers were allowed to sell shrimps to parties offering a higher price than FAQUIMEX, but would have to pay back their loan to FAQUIMEX with the Bank interest rate;
 - o Technical supports are provided by Aquaculture Extension Service throughout the shrimp crop season;
 - o Product must be compliant with food safety requirements.
- FAQUIMEX
 - o Establishing contract farming with farmers;
 - o As the legal entity to borrow fund from the Bank;
 - o Inspecting and monitoring the whole shrimp crop production;
 - o Quantifying fund for farmers' loans.

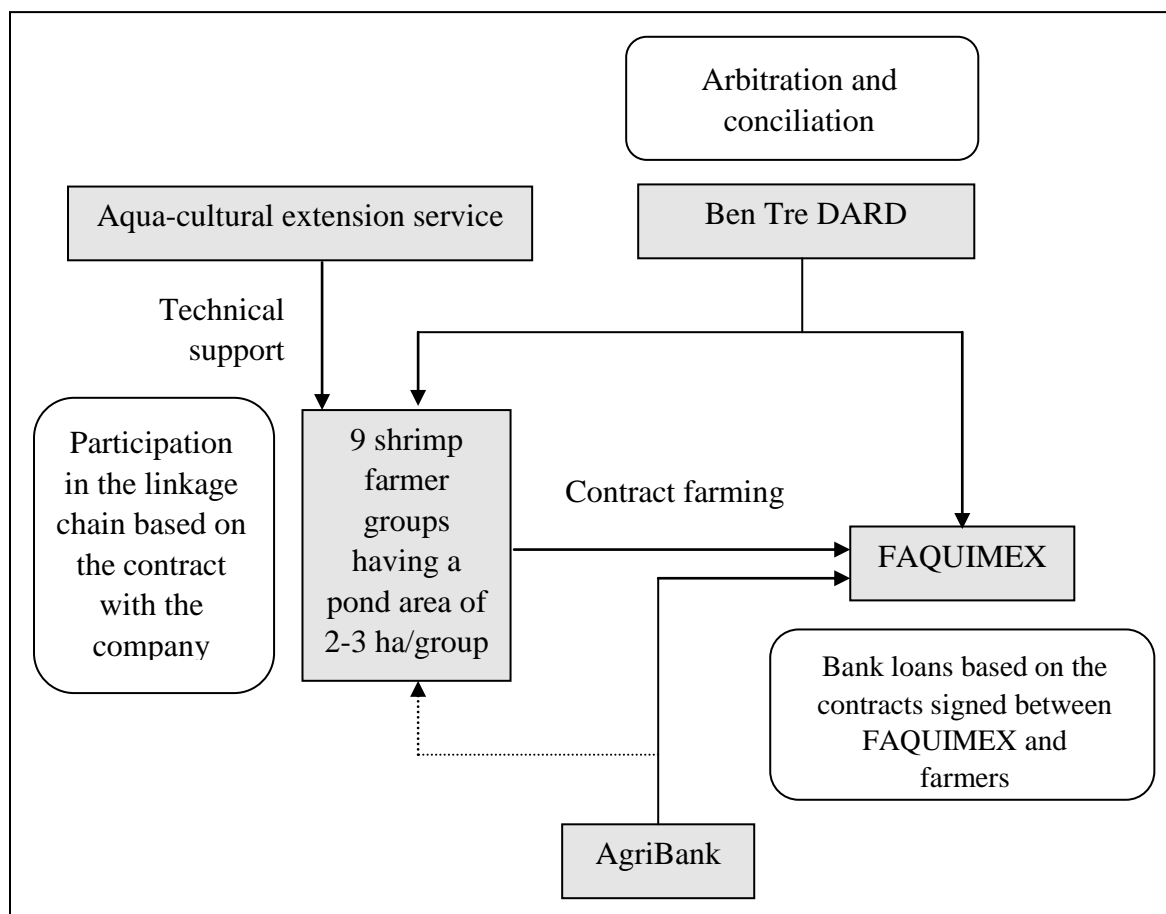


Figure 6.3-1 Vertical integration under contract farming form in Ben Tre province

In this model, DARD of Ben Tre province played its role as arbitration and conciliation to solve problems arising between two contractors. It also took a role of the initiative to link these two parties joining in the farming contract.

Aquaculture Extension Service of Ben Tre province played its role as a technical supporter for farmers who join in the integration.

Agribank of Ben Tre province took its role as credit supporter to lend FAQUIMEX basing on the contract signed with farmers.

After 2 years of implementation, the vertical integration under contract farming form was ended up. It indeed could not continue its activities because FAQUIMEX withdrew from the scheme. Both sides explained that the main reason leading to this failure was the disharmonized interest between two parties.

6.3.2 Contract farming for large cultivation scale in Soc Trang province

Difference from the model in Ben Tre province, the farming contract in Soc Trang province was implemented between a large scale farm and a processing plant. Vinh Thuan, a company playing as a large farm was one contractor and Phuong Nam was the other party in the contract.

Vinh Thuan is a private company which was established in 2002 with main functions to cultivate shrimp in Vinh Phuoc village, Vinh Chau district, Soc Trang province. Total production area of the company is 191.2 ha, of which there is 104 ha of water surface. In 2004, Vinh Thuan signed a farming contract with Phuong Nam, a processing plant in Soc Trang province, to supply their shrimp at the end of season. These two parties of contact were taking their under the following main clauses:

- Vinh Thuan
 - o Annual contract signing at floor price, selling products to Phuong Nam at market price;
 - o Receiving feedstuff supported from a partner of Phuong Nam;
 - o Cultivating and supply shrimp basing on the size given by Phuong Nam;
 - o As a debtor of Agribank Soc Trang for borrowing money basing on the contract with Phuong Nam.
- Phuong Nam company
 - o Annual contract signing at floor price, buying output products from Vinh Thuan at market price;
 - o Acting as a warrantee for Vinh Thuan to borrow money from Agribank Soc Trang;
 - o Monitoring post larvae seeding at the beginning of season in Vinh Thuan
 - o Monthly monitoring feedstuff supplying to Vinh Thuan;

The contract signed between Phuong Nam and Vinh Thuan was purely commercial. It was initiated by the needs of both parties on the quality of shrimps. However, after four year of cooperation, Vinh Thuan gave up the next year contracts with Phuong Nam due to unfair payment.

6.3.3 Analyse cases of contract farming in Ben Tre and Soc Trang provinces

FAQUIMEX and Phuong Nam wanted to establish a stable input network that guaranteed the raw shrimp food safety because it is a delicate export product that must comply with traceability and food safety requirement such as HACCP issued by the importing countries. Farmers and Vinh Thuan who participated in the vertical integration under contract farming form wanted to have opportunities to increase their access to financial support advancement and confirm the product consumption market at the shrimp harvest crops. However, objectively, the main aim of both sides participating in the linkage model was to “**maximize their profits**”. Besides, the implementation of the Prime Minister’s No-80 decision on the production linkage should also be considered.

The processing plant maximized their profits through the reduction of transaction costs (decrease of collecting and negotiating expenses) due to stable input supplies. Participant farmers and Vinh Thuan maximized their profits through a stable price at the end of shrimp crop season and gained an access to fund after 75 days of shrimp production.

Analyzing the above-mentioned reasons, the following issues are standing out:

Firstly, the implementation of the “market price - floor price” mechanism was one of the main causes for this linkage model failure. With this shrimp price mechanism, participating farmers were allowed to sell their shrimp to processing plant when the raw shrimp price on the market was lower than “floor price”, and could sell to other parties when price offered was higher than that of FAQUIMEX and Phuong Nam. Alongside contracts signed with farmers and Vinh Thuan, processing plants signed monthly contracts with importers based on the signing

date price. However, because of shrimp processing plants limited capacity, Vietnam has no stable consumption market. Thus, from time to time, processing plants would not collect shrimp at equal or higher market price, and indirectly lower shrimp price of farmers. Consequently, there would be a failure in the linkage fulfillment through contract farming because the processing plant could not gain any profit at all when participating in the farming contract. Obviously processing plants turned back to the traditional “product-handout” system with small and desultory components or to develop their own raw material production. In brief, the contract has no significance and non-economics.

Secondly, the model omitted to address risk share. The contract farming signed between farmers and FAQUIMEX in Ben Tre, and Vinh Thuan and Phuong Nam in Soc Trang indeed did not totally mentioned how losses would be shared, while risks linked with diseases and natural calamities were rather high. Shrimp farmers ended up bearing these risks full responsibility, particularly for the first 75 days of production. As most Vietnamese consider that “comfort is better than pride” (ăn chắc mặc bền), this arrangement affected farmers enthusiasm to participate in the linkage chain or would lately leave after risk happening.

Thirdly, farming contract was disadvantaged in the market by the smallness of its scale compared to big shrimp production units. The linkages were established with 9 farmer groups scattered in three districts (Binh Dai, Ba Tri and Thanh Phu). Participant groups needed funds for their production. However, due to their business small scale, they could not legally borrow money from the bank, thus the loan had to be provided by FAQUIMEX. This dependence pushed farmers in a disadvantageous position regarding the contract terms negotiation. The small scale of each farmer group prevented them to link up and benefit group discounts from input suppliers (such as feed, veterinary medicine retailers). Besides, the supplies excess demands, in the fact, had no pressure from the market on the plants that they have to sign contracts with farmers provide that to develop their own raw material zones for competition.

Fourthly, the vertical integration under contract farming from success has been affected by administrative misconception. As mentioned above, one of the processing enterprise’s objectives in joining the linkage was to create a product traceability system. However, as farmer to freely were allowed to buy inputs from different sources made processing plants un-able to control the raw shrimp quality and inputs uniformity - one of the first requirements in the administrative chain for product traceability. From then on, establishing a brand name for the enterprise shrimp products in order to access stringent international markets was jeopardized. This implies that the enterprise was unsatisfied with the model right from the start.

Fifthly, the Aquaculture Services could not fully play its management part in the linkage chain. For being the state management body in charge of the linkage chain coordination, the Aquaculture Service achieved in taking the initiative and driving model into operation. However, apart from production management, the Aquaculture Service had functions and power limitations that prevented it to solve the conflicts bursting between participants regarding their economic interests.

The foregoing are the main reasons that lead to the failure of the aquaculture production linkage between farmers and FAQUIMEX in Ben Tre province, and Vinh Thuan and Phuong Nam in Soc Trang province. Linkages are an indispensable process, in spite of, we should early or later realize. These reasons can also be found at the other locations of the contract farming in the MRD.

6.3.4 Farmers' attitude towards contract farming

Viability of vertical integration under contract farming form in shrimp value chain in Vietnam depends on the satisfaction of farmers and processing plants. Of which, profitability is a certain key component. Apart from that, motivation and attitude of partners towards contract farming should be considered as the factors that impact to the success of vertical integration.

Farmers integrate vertically in the value chain under contract farming for several reasons:

- Market certainty for their products at harvested time;
- Price stability;
- Provision of inputs on credit;
- Technical support from partners.

However, evidences showed that just few farmers involved in vertical integration under contract farming form in the MRD while many of them have motivation to join in.

Results of a survey conducted in 2009 on the attitude of farmers showed that there were 67.5% of farmers had lost with their shrimp cultivation at least one time while 32.5% of observations were never lost (Table 6.3-1).

Table 6.3-1 Percentage of successful farmers in shrimp cultivation

	Frequency	Percent (%)
Never lost	13	32.5
Lost	27	67.5
Total	40	100.0

Table 6.3-2 presents reasons of lost concerned mostly on low farm gate price of selling shrimp and shrimp disease with 44.4%, and 40.7% respectively. The rest problems came from pollution (11.1%) and bad climate (3.7%)

The lost in shrimp cultivation of farmers has pushed them look forward to a collaboration with other actors in the chain to reduce the risk that mostly came from low selling prices and low technical skills to manage farm activities in term of disease precaution.

As the fact that, 55% of farmers responded that creating a linkage through contract farming is important. They need to be sure about the market for their shrimp before harvesting. Unflustered price of harvested shrimps is also an important reason for them to wish a vertical integration.

Table 6.3-2 Reason of lost in shrimp production

Reason of lost	Frequency	Percent (%)
Shrimp disease	11	40.7
Bad climate	1	3.7
Pollution	3	11.1
Low price	12	44.4
Total	27	100.0

By contrary, there were 22.5% of observations replied that they were not interested in any linkage in shrimp cultivation while 15% have no idea about contract farming (Table 6.3-3)

Table 6.3-3 Attitude of shrimp farmers towards contract farming

	Frequency	Percent (%)	Cumulative percent
No idea	6	15.0	15.0
Not important	9	22.5	37.5
Neither important neither not	3	7.50	45.0
Important	16	40.0	85.0
Very important	6	15.0	100.0
Total	40	100.0	

However, results of Table 6.3-4 showed that there were 35.5% of interviewees who had lost in shrimp cultivation think vertical integration is important and very important (14 observations) while this number of farmers who never get lost is just 20%. Though this results is not statistically significant (crosstabulation sig at 0.254), but it could give an option that farmers who have lost in shrimp cultivation have more motivation to join in the linkage than the ones who are success. This result is the same conclusion of one research conducted in Thailand on sweet pepper by Schipmann and Qaim (2011).

Table 6.3-4 Cross tabulation of success/failure farmers and their attitude on vertical integration

		Farmer attitude on vertical integration					
Lost/success		No idea	Not important	Neither important neither not	Important	Very important	Total
	Success	0	3	2	5	3	13
	Fail	6	6	1	11	3	27
	Total	6	9	3	16	6	40

6.4 SHRIMP VALUE CHAIN MOVEMENT

As mentioned above, shrimp processing plants participated in the vertical integration under contract farming form with an expectation of ensuring their raw material quality and quantity. However, the failure of contract farming in Soc Trang and Ben Tre provinces broke their plans and lead shrimp value chain to a new structure.

At the early of stage of shrimp cultivation, the distribution of the raw material in the value chain is commonly from famers to collectors and then processors. Through the contract farming, shrimp raw material could go directly from farmers to processors. With the unexpected results in Soc Trang and Ben Tre provinces, shrimp processors established a new

production type in shrimp value chain in Ca Mau, Soc Trang and Ben Tre, self supplying raw material of processing plants so that famers are completely excluded (Figure 6.4-1).

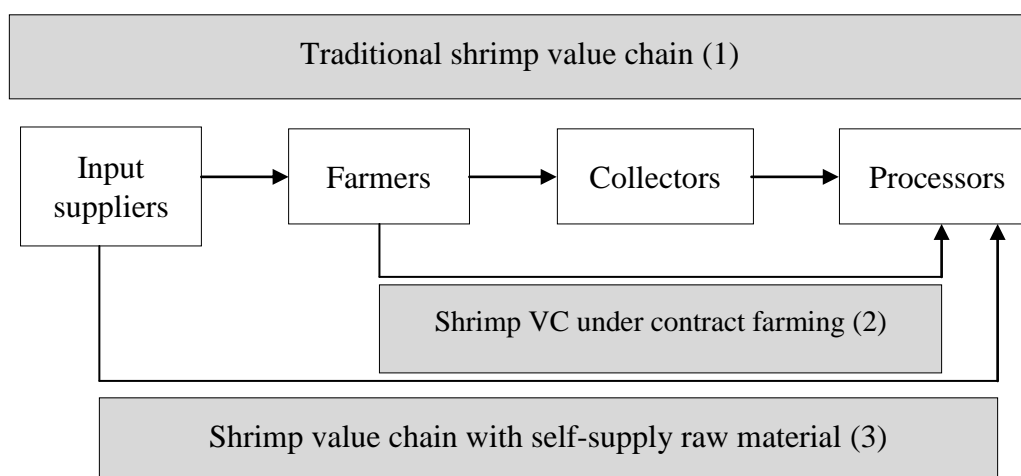


Figure 6.4-1 The movement of shrimp value chain structure in the MRD

The figure 6.4-1 shows that the number of farmers participating in the shrimp value chain reduces from the structure (1) to (3). In the traditional structure, both small and large scale farmers can join in the value chain to supply their shrimp to processor through a link with collectors. In the structure (2), only medium and large scale farmers could join in the value chain to supply their shrimp to processors through a farming contract. The structure (3) excludes all farmers when processors cultivate and supply shrimp raw material by themselves.

The movement of shrimp value chain created the problems of poverty reduction and social aspect. In the structure (2) and (3) of the shrimp value chain, processors do not need the supply of small farmers who account about 80% of producers in the MRD. Consequently, small farmers face to challenges of finding market of for their outputs. On one hand, poverty might rise up due to the number of farmers being in debt because they cannot sell their output to the market when all the production costs are already spent. On the other hand, unemployment also increases due to the giving up of small farmers in shrimp production while there is no other job for them to join in. The same problem will could happen with collectors when the contract farming is established. The dark future of small farmers and other actors in the shrimp value chain seems very clear.

Generally, it is not all of small farmers who are excluded from the shrimp value chain. The traditional structure always exists and small famers can sell their shrimp to processing plants through collectors. However, what is the market share of their shrimp when the customers' requirements of high quality in shrimp have been rising and their production status still remains? Due to the requirements of high shrimp quality from customers, the processors will have two options. They might remain or even expand their market if all requirements are met or they might lose their strict market and turn to the easier one. In the first option, processors need to create their own raw material zone to ensure the input quality or they might have a linkage with other actors.

The reality in the MRD shows that there is a tendency in creating raw material zone of processors. According to Mr. Duong Ngoc Minh, the vice president of VASEP, if a processing plant does not have a closed production process from raw material to final products, they must depend on the raw material supplied by farmers or other sources and will not have the initiative to decide on the quantity of shrimp for exporting due to the excess or lack of inputs. Consequently, the production cost will increase, the prices of shrimps will be very fluctuant, and the competition of processing plants will decline. According to him, if a processing plant had production capacity about 300 tonnes/day but due to lack of raw material, inputs supply only 50 tonnes/day, its production cost will be tripled. In order to have production efficiency, at least 50% of total input demand must satisfy. Therefore, processing plants in the MRD have a tendency to create their own raw shrimp material zone.

In the second option, processors will be lost and give their market to other competitors who meet customers' requirements. Demand for shrimp will be reduced. In the both options, small farmers will be limited their market if there is no changes in their technical production as well as organisational structure.

6.5 CONCLUSIONS

Though vertical integration is very important for value chain development toward to a sustainable sector in Vietnam economy, the implementation was just limited at a very small part of farmers. Most of shrimp cultivation farmers stay out of integration while the rest joined in the game without success. Vertical integration under contract farming form seems not for small scale production farmers who account a large part of shrimp production in the MRD.

HACCP international food quality control to satisfy customers' demands, decision No-80/2002/QĐ-TTg, culture, trust and corruption are main factors that influence actors' behaviors to integration in the shrimp value chain. While HACCP is a requirement that encourages shrimp actors in a mutual dependence, the decision No-80/2002/QĐ-TTg of the government seems not contributing an efficient support for farmers and processing plants to conduct a success contract. It must be recognized that contracts may not work for all products and that the "one size fits all" approach of Decision No-80/2002/QĐ-TTg may hurt, rather than help, farmers and other actors in shrimp value chain. Furthermore the complicated organisation structure and the overlap of management in the shrimp sector did not contribute an efficient business environment for actors to play their own role.

Farmer's attitude towards vertical integration under contract farming form seems not interest all producers, especially those who get success with their cultivation.

The failure of contracts in Ben Tre and Soc Trang province is due in large part to coordination failures among contractors that stem from the limited organization of farmers and imbalances in market relationships. Floor price mechanism, sharing risk, small scale of model and excess suppliers in the market, administrative misconception and inefficient management of government are main reasons of failures of contract farming in the MRD.

The movement of shrimp value chain develops a new structure. The tendency of creating raw material zone of processors will lead farmers to the very difficult problems in finding the market for their output. Poverty and social problems might appear.

CHAPTER 7. CONCLUSIONS AND RECOMMENDATIONS

7.1 CONCLUSIONS

The most important research findings relate to 1) the importance of vertical integration under contract farming from in agriculture in general and shrimp production in particular; 2) the shrimp production in the world, especially in Vietnam; 3) the flow of shrimp in the MRD and farmers production affectivity; 4) the vertical integration of farmers under contract farming form with a providing of social and technical barriers that affect ability of farmers to integrate in the shrimp value chain; 5) The future trends and opportunity for farmers to integrate vertically in the shrimp value chain in the MRD.

As mentioned in chapter 2, integration among actors is an inevitable tendency in sustainable value chain development. Integration means bringing together two or more parts into one. The most important advantages of vertical integration under contract farming form are found in transaction cost reduction, opportunities for innovation and product differentiation, gains derived from market information, risk reduction and market power increase. Contract farming is one of the most significant and powerful means by which farmers are integrated into national and international commodity markets and agro-industrial value chains. It is continually evolving process that has been applying worldwide though it is not a panacea to solve all problems of agricultural production in general and shrimp production in particular.

Shrimps, one of the most popular types of seafood in the world with approximately five million metric tons of shrimp, are produced annually. Most shrimp aquaculture occurs in China, followed by Thailand, Indonesia, India, Vietnam, Brazil, Ecuador and Bangladesh. The majority of farmed shrimp is imported to the United States, European Union and Japan. Shrimp development in developing countries is based on a strong demand for products from shrimp catches or aquaculture, the artificial reproduction control over shrimp, and the level of interest of national and international development agencies.

For the trends, in order to make systems biologically secure in for a significantly lower risk of disease coming from both environmental threats and devastated mortalities in shrimps farmed, recirculation shrimp farming technology has been developed. Though many of the best sites for shrimp farms already have been used, there is still opportunity for the expansion of shrimp farming, especially in Brazil, and several African nations.

Demand for quality shrimp is rising in three main market including EU, US and Japan. In order to supply quality shrimps which meet safety standards, exporters have to comply all the requirements of food quality standards set up by FAO, ISO, WTO, NGOs and private sectors.

Vietnam, one of the main shrimp producers in the world, started its shrimp production more than hundred years ago (Phillips, 2004). The sector developed strongly in 2000s after government issued the Resolution No. 09/2000/NQ-CP allowing farmers converting from rice to aquaculture production. Shrimp cultivate in Vietnam are undertaken with four types namely extensive, improved-extensive, semi-intensive, and intensive cultivations. Shrimp cultivate mostly in the MRD and black tiger shrimp is the main seed. In recent years, white leg shrimp has also developed strongly due to its high productivity.

Shrimp culture contributes a large share in GDP of the country, especially shrimp exports. Presently, Vietnam exports shrimp to 75 countries in the world, in which, Japan, the United

States and European Union are the main markets. Shrimp processing businesses in Vietnam are now also looking for other new markets, such as Switzerland, Australia and Canada.

Main problem of shrimp culture in Vietnam are disease, shrimp seed, environmental pollution, and management skill of farmers.

In order to increase the ability to developed markets such as the EU, Japan and US, the creation of a legal and regulatory framework fitting the legal standards required to access the specific market; private and public sector involvement in investments in processing, facilities, machineries and marketing skills, which are competitiveness-drivers on global markets are main strategies of shrimp sectors in Vietnam.

In the MRD, the main flow of shrimp raw material is from farmers to collectors at level one with about 95% to total shrimp raw material production. These collectors buy shrimp from other collectors at level two and three to supply to processing plants a volume of about 97.5%. Processing plants occupied 97.5% of shrimp production in the MRD to supply domestically or export.

Shrimp value chain in the MRD currently consists both primary and secondary actors. Primary actors include input dealers, hatcheries, farmers, collector level 1, collector level 2, collector level 3 and processing plants. Of which collectors level 1 and processing plants are the leaders of the shrimp value chain in the MRD.

Farmers cultivate shrimp individually in small scale. They are lack of market information, technical skills, as well as financial capital for their production. They are therefore likely to stay at the lowest position in the shrimp value chain and having low negotiating power. First forward customers of farmers are collectors. Their second forward customers are processing plants though this form was finished some years ago. In the recent years, farmers are likely having a trend to change their cultivation technique especially stock density. This trend remains strongly affected by market demand. Shrimp yield maintenance for some period of time during which density decreases could signify that farmers achieved higher production efficiency. Cultivated shrimp yield is unstable, which confirms that shrimp cultivation is a very sensitive sector that requires high production skills from farmers. Post larvae, feedstuff, and chemical still account for the biggest share of shrimp cultivation variable cost which is about 97% costs. In which, feedstuff occupies more than 64% and chemical cost stands about 23%. Costs of labour, electricity and fuel were just less than 3%. There is no change was brought by farmers to their cultivation technique in terms of feedstuff and chemical use during the period 2006-2009. Shrimp unit cost fluctuated from 68-75 thousand VND/kg depending on the cost accounted and harvested yield. Return from cultivated shrimp is not high, which confirms that farmers' strategy regarding shrimp cultivation is based on "income maximization" instead of "profit maximization".

Processing plants are the main leader in shrimp value chain in the MRD. They determine shrimp prices in the market basing on the contracting price signed with their forward customers and market prices. They also set up requirements of shrimp quality and size in the market to assure customers' demands. However, they are not successful in quality control of final shrimp products due to the limitations of financial capital, knowledge, awareness, as well as the quality of raw material supplied by collectors and farmers. In order to solve this problem, processing plants need to establish a linkage though vertical integration under contract farming with other actors in the shrimp value chain like farmers and collectors.

However, though vertical integration is very important for value chain development toward a sustainable sector in Vietnam economy, the implementation was just limited at a very small part of farmers. Most of shrimp cultivation farmers stay out of integration while the rest

joined in the game without success. Vertical integration under contract farming form seems not for small scale production farmers who account a large part of shrimp production in the MRD.

HACCP international food quality control to satisfy customers' demands, decision No-80/2002/QĐ-TTg, culture, trust and corruption are main factors that influence actors' behaviours and their opportunities to integration in the shrimp value chain. While HACCP is a vital requirement that put shrimp actors in a mutual dependence, the decision No-80/2002/QĐ-TTg of the government seems not contributing an efficient support for farmers and processing plants to conduct a success contract. It must be recognized that contracts may not work for all products and that the "one size fits all" approach of Decision No-80/2002/QĐ-TTg may hurt, rather than help, farmers and other actors in shrimp value chain. Furthermore the complicated organisation structure and the overlap of management in the shrimp sector did not contribute an efficient business environment for actors to play their own role.

Farmer's attitude towards vertical integration under contract farming form seems not interest all producers, especially those who get success with their cultivation. Farmers generally prefer non-contract options due to non-transparency of interest share as well as cost account.

The failure of contracts in Ben Tre and Soc Trang provinces is due in large part to coordination failures among contractors that stem from the limited organization of farmers and imbalances in market relationships. Floor price mechanism, sharing risk, small scale of model and excess suppliers in the market, administrative misconception and inefficient management of government are main reasons of failures of contract farming in the MRD

The movement of shrimp value chain develops a new structure. The tendency of creating raw material zone of processors will lead farmers to the very difficult problems in finding the market for their output. Poverty and social problems might appear.

These issues suggest greater strengthening and tightening of the value chain through improved organization, particularly among producers. At the same time, this has implications for the poor in terms of their participation in contracting relationships and whether they can benefit from the development of such long-term relationships to raise quality and improve production practices.

7.2 RECOMMENDATIONS FOR LINKAGE DEVELOPMENT IN THE AGRICULTURAL PRODUCTION CHAIN

Vertical integration under contract farming can improve shrimp sector on one hand but on the other hand, its negative aspect also created some risk for small producers who are in the weakness position in the value chain. It is therefore not surprising that integration under contract farming is not for all actors. The application of vertical integration under contract farming should be considered well before starting.

Vietnam's shrimp cultivation peculiarities are its small-scale; spontaneity; non-projected and difficulty to control. Farmers flock massive shift towards high profit production has caused a high supply demand and an excess agricultural products offer in the market. This did not make processing plants to face with the pressure from the market in developing their own raw material zone for competition. Considering macro-management, "planning and projection of shrimp production zones" is therefore the prior matter to address. For this reason, farmers are

only allowed to produce crops/livestock according to planned projection, to restrict the un-managed production downsides.

Re-organizing shrimp farmer's into legal teams or groups or cooperative is also a recommendation to limit the smallness of the existing shrimp cultivation units in Vietnam. Legal team/group formation is the only way to help farmers gaining strength to negotiate with processing plants. Through the economic scale growth and application of the services with market orientation such as product quality management, new technology application, product certification and product labeling, the farmers could partly restrain plants pressure when collecting their shrimps once harvested and could also enhance their managerial capacity in the goods chain. The team/group legality also permits farmers to borrow money from the bank directly, avoiding thereby the processing plants dependence on the legality as it was happening before. An important success factor in farmers' linkage into team/group is the "team/group leader neutrality". If the team/group leader is also participating as team/group member, the success probability will be very low because the core issue of vertical integration under contract farming form will not be solved: transparency and mutual interest harmonization.

The establishment and development of aquaculture production insurance can also constitute a solution to address the risk for all sides when participating in vertical integration under contract farming form. Batch-product insurance during processing and consumption has usually been applied for big plants producing for export. The farmers and small plants, however, have not been interested in this matter because of high insurance rate, or leaves open without implementation. Therefore, the establishment of aquaculture production insurance should determine an acceptable rate that all sides can bear with the view to reduce the risks.

The authority role should not be missed in the development of a vertical integration. This authority is the unique body to coordinate and link all the factors from input suppliers, farmers, collecting units, processing factories to the bank in the linkage chain. Creating a legal framework to enhance the position and the role of this body that they can solve the conflicts of interest between the factors is therefore indispensable.

The linkage establishment under vertical integration should first be carried out in a pilot model for some target products. Financial and technical supports with open conditions for participants are required for the farming contract success. The vertical integration extension to other locations should only be permitted once the pilot model success is achieved, in order to avoid the phenomenon of following the crowd, "one and all men take part in linkage, one and all houses take part in linkage", causing a negative impact on the thinking of the producers when linkage failing.

In brief, re-structuring the agricultural production organization through linkages is an indispensable process, not only in Vietnam. Linkages development through the participant factors is necessary to improve the production efficiency and to evolve toward a sustainable agriculture. The combination of legal farmer groups and collecting and processing units linked through contract farming is considered to be the optimal solution under Vietnam's current conditions. This scheme will enhance farmer's capacity, ensure the right and interests, increase household's income and maintain the dynamism and strength of Vietnam's agricultural products market. By such process, the product quality will also be controlled through an almost closed production cycle.

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APPENDIXES

Appendix 1. Stock density fluctuation (2006-2009)

Year	Minimum (post larvae/m ²)	Maximum (post larvae/m ²)
2006	10	30
2007	12	35
2008	9	30
2009	9	32

Appendix 2. One way ANOVA of stock density (2006-2009), first crop

	Sum of squares	df	Mean square	F	Sig.
Between groups	304.209	3	101.403	3.821	.011
Within groups	4113.728	155	26.540		
Total	4417.937	158			

Appendix 3. One way ANOVA of yield (2006-2009), first crop

	Sum of squares	df	Mean square	F	Sig.
Between groups	1.289E7	3	4296724.608	.556	.645
Within groups	1.197E9	155	7724851.044		
Total	1.210E9	158			

Appendix 4. Estimate farm costs and returns of shrimp production in the first season (Unit: VND 1000)

Item	Year	2006	2007	2008	2009
GROSS RETURN (1)		275.519	293.824	222.032	351.464
VARIABLE COSTS (2) = (2.1) + (2.2) + (2.3) + (2.4) + (2.5) + (2.6)		172.032	175.271	197.568	257.145
Post larvae cost (2.1)		11.806	10.195	9.732	11.375
Feed cost (2.2)		112.444	118.832	128.170	179.848
Chemical cost (2.3)		33.248	34.873	43.314	47.059
Fuel cost (2.4)		12.413	9.311	12.710	16.747
Electricity cost (2.5)		1.569	1.411	0.894	1.184
Other variable cost (2.6)		0.551	0.649	2.747	0.932
RETURN ABOVE VARIABLE COSTS (3)		103.487	118.553	24.464	94.319
Short term fixed cost (4) = (4.1) + (4.2) + (4.3)				16.327	18.645
Pond preparation (4.1)				7.041	9.538
Water preparation (4.2)				9.276	8.278
Other fixed cost (4.3)				0.010	0.828
Depreciation (5)				4.502	6.029
FIXED COST (6) = (4) + (5)				20.829	24.674
RETURN TO OPERATOR LABOUR (7) = (3) – (6)				4.436	69.645
Hired labor cost (8)				0.488	3.024
RETURN TO FAMILY LABOUR (9) = (7) – (8)				3.948	66.621
Family labor cost (10)				19.640	20.893
NET RETURN (11) = (9) – (10)				-15.693	45.728

Appendix 5. Questionnaire for shrimp production household

Code

Name of interviewer:

Date of interview:

1. GENERAL INFORMATION

1.1 Full name of interviewee:

Hamlet:

Village:

1.2 Age of householder:

2. INFORMATION OF AGRICULTURAL PRODUCTION

2.1 Area of homestead land 2009 (ha): Area of owner (ha):
.....

Of which: Area of garden (ha): Area of home land (ha):
.....

2.2 Area of agricultural land (ha):

Origin of land: ☐ Inherit ☐ Buying ☐ other (Pls detail):

2.3 Area of rented agricultural land (ha): rental (VND Million/ha): Renting time (year):

2.4 Area of land sold since 2007 (ha): Year of selling: Price (VND Million/ha):

Reason of selling land.....

2.5 Area of land for rent since 2007 (ha):

Time for rent: Year for rent: Rental (VND mill/ha):

Reason for rent

2.6 Income of crops in 2008

Crop	Area	VND mill/year)

2.7 Income of livestock in 2008

Animal	Number of animal	Selling price	Income (VND mill/year)

2.3 Income of other agricultural activities in 2008

Activity	Income (VND mill/year)

2.6 Income of aqua-products, excludes shrimp

Income 2008 (VND mill/year)	
Area of pond for fish (m ²)	

2.7 Credit:

If family borrow money last 2 years? Yes: ☐

No: ☐ If yes:

	2008
Amount (Mill VND)	
Interest (%/month)	
Duration (month)	
Lender (Bank/Credit fund)	
Criteria of borrow (1 = mortgage, 0 = other (detail))	
Percentage of amount use for (%):	
- shrimp production (%)	
- agricultural production (%)	
- household consumption (%)	
- pay last debt (%)	
- other (detail) (%)	

2.8 Non-farm activities

Does any family member work in non-farm activity?

Yes: ☐

No: ☐

If yes:

Activity	Number of people	Income (Mill VND/person/month)
Worker at a factory		
Trader		
Handicraft worker		
Other		

3. INFORMATION OF SHRIMP PRODUCTION

3.1 Shrimp cultivation area 2008 (m²): Of which, area of water surface (m²):

3.2 Shrimp cultivation area 2009 (m²): Of which, area of water surface (m²):

3.3 Type of shrimp cultivation:

☐ Intensive ☐ Semi-intensive ☐ Improved-extensive ☐ Extensive

3.4 Number of crop/year:

3.5 Cultivation duration

	T1	T2	T3	T4	T5	T6	T7	T8	T9	T10	T11	T12
2008												
2009												

3.6 Shrimp cultivation density

	2008		2009
	1st crop	2nd crop	
Number of post larvae/m²			

3.7 Place to buy post larvae:

- ☐ In the village ☐ Other village in the same district
☐ In the other district in BL province ☐ In other province

3.8 Input cost

Shrimp cultivation capital?

Source of capital	Amount 2008 (Mill VND)	Amount 2009 (Mill VND)
Family saving		
State bank/ credit fund		
Private bank		
Loan from relatives		
Contribution of co-owner		
Other		

Fixed cost: infrastructure cost?

Investment	Cost in 2008 (Mill VND)		Cost in 2009 (Mill VND)
	1 st crop	2 nd crop	1 st crop
Pond construction			
Canal construction			
Pond preparation			
Water treatment			
Water pump			
Net system			
Ventilation system			
Well construction			
Other			

Variable cost:

Cost	2008 (Mill VND)		2009 (Mill VND)	
	1 st crop	2 nd crop	1 st crop	2 nd crop
Post larvae cost				
Feed cost				
Chemical cost				
Fuel cost				
Electricity				
Other				

3.9a Cost of input supply for shrimp cultivation

Year of 2008

	1st		2nd		Note
	Quantity	Price	Quantity	Price	
Feedstuff					
1					
2					
3					
4					
Chemical for water treatment					
1					
2					
3					
4					
Chemical for shrimp treatment					
1					
2					
3					

Year of 2009

	1st crop	
	Quantity	Price
Feedstuff		
1		
2		
3		
Chemical for water treatment		
1		
2		
3		
Chemical for shrimp treatment		
1		
2		
3		
4		

3.10 Output

	Production (kg) 2008	Price (1,000VND/kg) 2008
1 st crop		
2 nd crop		

3.11 Labour cost

	2008
Number of family member participated in the cultivation	
Number of hired labour for cultivation	
Number of working hour/person/day/crop	
Number of working days/month/person/crop	
Price of hired labour (thousand VND/month)	

4. INFORMATION OF LINKAGE IN SHRIMP CULTIVATION

4.1 Where did you buy post larvae?

☐ In the village ☐ In the district ☐ In the province ☐ Other province
(Indicate:...)

4.2 How did you pay for post larvae?

☐ Cash when buying ☐ Post-paid at the end of crop
☐ Haft when buying and haft post paid ☐ Other (Please indicate)
.....

4.3 Do you have any agreement with supplier on the quality of post larvae?

☐ Yes ☐ No

If yes: Please detail
.....
.....
....

4.4 What are your limitations on buying post larvae?:

.....
.....
.....
.....

4.5 Where do you buy chemical for shrimp cultivation?

☐ In the village ☐ In the district ☐ In the province ☐ Other province
(Indicate...)

4.6 How did you pay for input supplier?

☐ Cash when buying ☐ Post-paid at the end of crop
☐ Haft when buying and haft post paid ☐ Other (Please indicate).....

4.7 Do you have any agreement with input supplier to buy their goods?

☐ Yes ☐ No

If yes: Please detail

.....

4.8 What are your limitations on buying input supply?

.....
.....
.....
.....

4.9 Where did you sell your output?

- ☐ Collectors at the village ☐ Collectors at the district
☐ Collectors at the province ☐ Collectors from other provinces (Please indicate.....)

4.10 Have you changed collectors to sell your output? ☐ Yes ☐ No

If yes, please explain.....

4.11 Who gave the price of shrimp?

- ☐ Collector ☐ You ☐ Both you and collector ☐ Other (please indicate.....)

4.12 What are your limitations on selling shrimp?

.....
.....
.....
.....
.....

4.13 Who support cultivation technique for you?

- ☐ Yourself ☐ Extension workers
☐ Technical expert of input supplier ☐ Other (Please indicate)

4.12 Have you ever lost in shrimp cultivation last two year?

- ☐ Yes ☐ No If yes:

- Do you know the reason? ☐ Yes ☐ No

If yes: Please explain:

.....

4.14 Your awareness on the importance of linkage in shrimp cultivation?

- ☐ Very important ☐ Important ☐ Medium
☐ Not important ☐ No idea

Please explain:

.....
.....

4.15 In your opinion, what should we do to build a linkage among shrimp cultivation farmers?

.....
.....
.....

4.16 In your opinion, what should we do to build a linkage among shrimp cultivation farmers and processing plants?

.....
.....

5. OTHER INFORMATION

5.1 Difficulties and disadvantages in shrimp cultivation:

Do you face any problem of:	Yes/No
- Chemical residue	
- Salinity reduction	
- Water quality reduction	
- Bad climate	
- Risk in shrimp cultivation	
- Diseases	
- Environmental pollution	
- Unstable post larvae price	
- Unstable shrimp price	
- Unstable price of input supply	
- Unstable price of hired labour	
- Unstable yield	

5.2 Production orientation and awareness of household on shrimp cultivation

	Yes/no
Lack of capital?	
Lack of labour?	
Lack of land?	
Have enough technical skill?	
Have enough market information?	
Have support from the government?	
Have the dependence among shrimp cultivation farmers?	
Have risk in cultivating shrimp?	
Do you have any impact of salinity from surrounding farms?	
Your orientation in shrimp cultivation? (1=Remain, 2 = Reduce, 3 = Develop them, 0 = No opinion)	
How you do think about the importance of shrimp income on total income of the family (1=Not important; 2=Less important; 3=Medium; 4=Important; 5=Very important; 0=No opinion)	

5.3 Level of competitiveness among shrimp farmers in the same region?

- ☐ Very high ☐ High ☐ Medium
☐ Not high ☐ No opinion

5.4 Variation of shrimp farmers in the region?

- ☐ Increased ☐ Less increased ☐ Not increased
☐ Reduce ☐ Reduce strongly ☐ No opinion

Appendix 6. Open questionnaire for shrimp producers in Ba Tri, Ben Tre

1. General information

- - Name of interviewee:
- Telephone:
- Address:

2. Information of farmer group organization

- Foundation year of group:
- Number of members:
- Production area of group:
- Relationship among members in group: (relative, neighbor, contiguous land)
- If group has legal entity? If yes, what kind?

3. Motivation of farmer group to link with FAQUIMEX

- Advantages of group before joining in the linkage with FAQUIMEX?
- Disadvantages of members in group before joining in the linkage? (Lack of capital? Lack of technical skills? Market risk? Price risk?)
- Expectations of group when joining in the linkage with FAQUIMEX? (Get investment capital? Improve technical skills? Contract farming? Stable selling price? Higher selling price?)

4. Linkage operation between farmer group and FAQUIMEX

- Year of starting linkage:
- Linkage form: (land to rent? Profit share basing on capital share? Others form?)
- Principle of operation:
- Capital contribution form among members in group:
- Capital contribution with FAQUIMEX:
- What are the responsibilities of framers to this linkage?

5. Benefits from linkage

- What are the advantages and disadvantages of farmers after joining in the linkage?
- What are the differences from production efficiency among non-linkage and linkage farmers in the region?
 - a. To have technical support?
 - b. To have post larvae supply?
 - c. To have financial support in time?
 - d. To have higher shrimp yield?
 - e. To have more knowledge of farm management and shrimp quality?
 - f. To have better quality of harvested shrimp?

- g. To reduce production cost?
- h. To assure the right selling price?
- i. To have higher profit?

6. Trust and relation building

- Trust level of farmers group to processing plant in this linkage?
- Did the farmer group get external impacts to this linkage? (encouragement? Objection? Enticement from other processing plants? Enticement from other collectors?)
- Did this linkage get assistance form local authorities? If any, please detail?
- Which central policies affect to shrimp production of farmers and linkage?

7. Criteria to maintain and develop the linkage

- What should the partners do to maintain and develop this linkage model?

Appendix 7. Questionnaire for Vinh Thuan company

1. Year of foundation

- What are the differences of company's products from others?
- When did the company start linking with Phuong Nam as contract farming?
- What were company motivations in this linkage?
- Who was the initiate of the linkage?
- How does this linkage operate?
- Does the company get government assistance for this linkage? If yes, detail:
- Which central policies affect the linkage and shrimp production of company?
- Do partners in the linkage often meet each other during the cooperation time? If yes, frequently?
- How much trust level of the company to this linkage between VinhThuan and Phuong Nam?
- Which factors needed from both sides to maintain to maintain the linkage?
- Which advantages that both sides get from the linkage?
- Who decide selling price of company's out put?
- How about risk share in the linkage?
- Who is the main contact person form Phuong Nam in this linkage?
- What are the main articles of the contract?
- Do you have any article mentioning the shear of risk in shrimp cultivation? If yes, what is the percentage of each party?

Appendix 8. Farming contract of FAQUIMEX and farmers

FAQUIMEX

Socialist Republic of Vietnam

Linked Production Group . . .

Independence – Freedom – Happiness

No- . . . /QC-TSX

Ben Tre, Date 2006

REGULATION

The Activity Regulation of the Division of FAQUIMEX Association for Shrimp Sustainable Culture and Processing

(Attached with the Decision No- /2006/QĐ-Cty)

CHAPTER I

GENERAL TERMS

Article 1: The name

- Division of FAQUIMEX Association for Shrimp Sustainable Culture and Processing (DFASSCP)
- DFASSCP was established on 2006 under the Decision No- . . . /QĐ-Cty.

Article 2: Objectives and activity scope of the DFASSCP

- The DFASSCP has its objectives of activity linking, productivity and production efficiency improvement, culture environment protection, pests and diseases alleviation, compliance of criteria on the product quality, hygiene and safety for raw shrimps.
- The DFASSCP has its activity scope in input supplies and raw shrimp collection.
- Improvement of shrimp culture efficiency and development of sustainable shrimp production.

CHAPTER II

OPERATING PRINCIPLES, RESPONSIBILITIES AND RIGHTS OF THE DFASSCP

Article 3: Operating principles

- Voluntaries and equality with all DFASSCP's members.
- Mutual benefits and mutual risks sharing.
- Self management of activities, self response to the law.
- The DFASSCP operates under the control and management of the DFASSCP's head following this regulation and the existing laws.

Article 4: Responsibilities of the DFASSCP

- To propaganda the DFASSCP's objectives.
- To help the DFASSCP's members to improve their productivities, product quality and efficiency.
- To update and supply new market information within the DFASSCP's activity scope.
- In collaboration with functioning agencies and local authorities to guide the DFASSCP's members on the contract procedures, feed supplies, money support and shrimp selling.
- To promptly solve difficulties and constraints of the DFASSCP's members with the view to have good efficiency in the whole production period.
- To create a stable raw material source with good quality in term of products safety for related shrimp processing-exporting units.
- To create and develop the linkage forms, coordinate activities among DFASSCP's members on the voluntary base and multi-lateral benefits.
- To protect the plausible and legal benefits of the DFASSCP and DFASSCP's members.
- On behalf of the DFASSCP's members to propose the government the relating matters on shrimp production, development and exportation.
- To develop facilities and expand the DFASSCP scale.

Article 5: The rights of the DFASSCP

- To have the right to control the technical management operations of the shrimp production units in the DFASSCP.
- To have the right to request the DFASSCP's members to supply information of shrimp production, veterinary medicine use, feed and chemicals to feed suppliers, money lenders and raw shrimp collectors.
- To have the right to propose the feed suppliers and money lenders to stop supporting feed and money in case the DFASSCP's members do not fulfill as the signed contract contents.
- To have the right to organize and collaborate the activities among the DFASSCP's members for mutual benefits, conciliate the inter-disputes of the DFASSCP.
- To have the right to collaborate with functioning agencies and related organizations to implement the DFASSCP's tasks.
- To have the right to receive the legal sponsors from the international and domestic sources.
- To have the right to enroll and expel the members.

CHAPTER III

DFASSCP's MEMBERS

Article 6: DFASSCP's members

Members of the DFASSCP consist of:

*** Official members:**

- Organizations and individual shrimp producers, shrimp processing and exporting units in Ben Tre province.
- Organizations and individuals participating in the post-lave business, feed, veterinary medicine and chemicals supplies for shrimp in the whole country.
- The banks supporting money for shrimp production and processing.

* Honorary members:

- Organizations and individuals having good contributions to the DFASSCP would be voted by DFASSCP congress or by DFASSCP's head.

* Conditions for DFASSCP's members who participate in the DFASSCP

- To ensure the product safety condition.
- To ensure good facilities and enough fund.
- To comply the announced procedures on the product quality and with the approval of the DFASSCP's head.

Article 7: The duties and the rights of the DFASSCP's members

* The rights

- Be promptly informed necessary information.
- Be supplied the training and consulting services and other information relating to shrimp production and exportation.
- The right to participate in the activities organized by the DFASSCP
- The right to vote, candidate and nominate members for DFASSCP.

* The duties

- Strictly implement the regulations of the DFASSCP.
- Properly implement the articles in the contracts among the DFASSCP's members.
- Actively participate in the activities of the DFASSCP.
- To protect the prestige of the DFASSCP, not to be permitted by the name of the DFASSCP in any case of transaction without entrusting of the DFASSCP's head.

Article 8: Procedures to enroll into DFASSCP's and terminate the member's right

* Enrolment procedures

1. Organizations and individuals satisfied the above-mentioned terms in the article 6, voluntarily enrolling to participate in the DFASSCP and taking part in the DFASSCP's establishment congress will be approved as the DFASSCP's members.
2. After the DFASSCP's establishment congress, any organizations and individuals want to joint into DFASSCP have to apply documents to DFASSCP's head. The documents consist of:
 - Joining form.
 - Declaration of the production facilities and fishery business.
 - The copy of the establishment decision and business license.
 - Curriculum vitae of the competent representative.
3. The enterprises, organizations and individuals who agree this regulation and voluntarily propose to joint into the DFASSCP will be approved as the DFASSCP's members with more than 50% of agreement of the commissioners.
4. The DFASSCP's head informs the new members list to all DFASSCP's members within 15 days after the new members be approved.

* The procedures to terminate the member's right

1. The DFASSCP's members who voluntarily propose to leave the DFASSCP should apply form to DFASSCP's head. The member's rights and duties will be ended after the DFASSCP's head releasing the approval circulation.
2. The DFASSCP's member is expelled in the following cases:
 - Causing serious influences to prestige of the DFASSCP.

- Violating seriously the regulation contents and other provisions of the DFASSCP.
- 3. With more than 50% of expelling opinion of the commissioners, the DFASSCP's member be expelled. The expelling decision comes in effect after the signed date by the DFASSCP's head.
- 4. The DFASSCP 's head informs the voluntarily leaved and expelled members lists to all other DFASSCP's members.

CHAPTER IV

ORGANIZATION OF THE DFASSCP's MANAGING BODY

Article 9: Organizational structure

- The DFASSCP consists of head and deputy head.
- Supervisory board.
- Members

Article 10: The DFASSCP

- The DFASSCP operates under the execution and management of the DFASSCP's head. The number of members is elected by the DFASSCP's congress.

Article 11: Duties entrusting in the DFASSCP

*** The DFASSCP head's duties**

- Executing the DFASSCP activities in term of economics, fund and technical supports, activity plan, supervision and product consumption.
- Directing and executing all activities within the duties and rights frameworks of the DFASSCP-FAQUIMEX.
- Financial management.

*** The DFASSCP deputy head's duties**

- To directly carry out some work entrusted by the DFASSCP's head.
- To develop and expand the DFASSCP scale in the coming years.
- On behalf of the DFASSCP's head to operate the DFASSCP activities in case of the DFASSCP's head in absence.

*** The DFASSCP commissioner's duties**

- To support related agencies on the activity management of the DFASSCP in case of need.
- To encourage the DFASSCP's shrimp production units to fulfill the signed contracts with fund, feed, veterinary medicine and chemicals suppliers and execute the government provisions on the sustainable shrimp production sector.
- In collaboration with related services and sectors in the management of sustainable shrimp production techniques of the shrimp production units, to help the inputs and outputs suppliers to fulfill the signed contracts during the shrimp production season of the DFASSCP.
- Gathering the member's opinions on the fund support, inputs supplies, outputs consumption during the contract implementation as well as on DFASSCP management supervision provide that to have sound solutions.

Article 12: The operating principles of the DFASSCP

- The DFASSCP works under the principles of centralization and democratization. Monthly conference is held to exchange experiences, discuss problems and draw out activity and management plans for the next time. The DFASSCP's head can convene an unscheduled conference to solve the matters in case of need.

Article 13: The DFASSCP's supervisory board

- On the name of the DFASSCP to supervise the activities of the DFASSCP. The number of members in the supervisory board is elected by the DFASSCP congress.
- The term of the supervisory board is lasted as the shrimp production period of the DFASSCP.
- The supervisory board acts independently with the DFASSCP under the DFASSCP regulations.
- The supervisory board's expenses relating to DFASSCP activities are covered by the DFASSCP.

*** The DFASSCP supervisory board's duties**

- Inspecting and monitoring the activities of the DFASSCP's members on the execution of the regulations, finance and resolutions of the DFASSCP.
- Inspecting, informing to DFASSCP's members and requesting to resolve the matters reflected by DFASSCP's member's

*** The rights of the supervisory board**

- Requesting the DFASSCP to held an unscheduled meeting in case of some matters arisen relating to the DFASSCP.
- Requesting the DFASSCP's members to supply information relating to the DFASSCP.

CHAPTER V

FINANCE OF THE DFASSCP

Article 14: The finance of the DFASSCP

a. The revenues

- From the DFASSCP's enrolment fees (the enrolment fees rate is basing on the production efficiency of the members, the concrete fees rate is decided by each term congress).
- From the international and domestic sources.

b. The expenses

- For DFASSCP and supervisory board activities, and purchasing facilities.
- For mass media activities, and
- Others logical activities.

The DFASSCP decides the DFASSCP's management and financial regulations in concordance with the government's financial regulations and be public with DFASSCP's members throughout the annual congress.

The DFASSCP's finance is inspected and informed yearly to the DFASSCP's members by the supervisory board.

CHAPTER VI

DISSOLUTION OF THE DFASSCP

Article 15: The DFASSCP terminates its activities in the following cases

- Voluntary dissolution by the decision of more than 50% (on the base of the converted enrolment fees value) of all DFASSCP's members.
- Stop operating during 12 months continuously.
- The FAQUIMEX's Director releases the dissolution decision and organizes the liquidation board. The liquidation board has responsibility to state the dissolution results to all DFASSCP's members.

CHAPTER VII

IMPLEMENTING ARTICLES

Article 16: Rewarding and Discipline

- Outstanding individuals of the DFASSCP's members who had carried out good rights and duties of the DFASSCP regulations would be rewarded with the congress voting.
- Individuals of the DFASSCP's members who had wrong acts and violate the regulations would be disciplined.

Article 17: Implementing

- Assigning the DFASSCP's head to deploy this regulation to DFASSCP's commissioners, supervisory board and members to perceive for implementing.
- This Regulation has 07 Chapters with 17 Articles. It had been approved by the DFASSCP-FAQUIMEX on 2006.
- This Regulation comes in effect on the signing date.

During the implementation, if any constraints arisen, it will be promptly informed to FAQUIMEX for consideration and directing.